IPCorder – User manual

April 14, 2009

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Chapter 1

Introduction

IPCorder is a central management system for security devices (typically cameras and sensors), which employ the IP protocol. The system provides the following capabilities:

- Offers a 'soft' interface, which handles all the complexities of the various device inputs, masking these from the user, thereby simplifying configuration considerably and offering centralized processing of the output.
- Automatically detects and configures new devices, then enters them into the system.
- Outputs from multiple sources (camera views, sensor statuses) can be organized, grouped, and viewed simultaneously. In other words the IPCorder can display a picture from various IP cameras/videoservers from different producers, values from them and possibly from other sensors, in unified user interface.
- Coordinates the activity of the sensors and cameras, and allows them to interact.
- Centralizes data storage (videos, images, values, ...) and provides an intuitive interface for searching and downloading records.
- Records event statistics, status changes, and based on these the system can execute various user-defined tasks (sending e-mail when an alarm occurs, turn a camera when a door is opened, and so on). For the automation of monitoring tasks, more experienced users will find the scripting language provided is a powerful tool. For those less experienced, the simplified interface makes defining responses to events a matter of a few mouse clicks.
- All devices and the system itself can be controlled through the web interface. In the case of remote access (e.g., from the Internet), the system allows to drive a translation of inherent addresses on external ones dynamically, using a router/modem and a UPnP Port Forwarding function. Except the automatic setting the dynamical driving provides a higher system security, because the picture of the cameras is accessible from the external net (the Internet) only if a user is successfully loged in the IPCorder's web interface. Besides this option the IPCorder of course supports a manual setting of the addresses translation on the router/modem.
- "tunneling" of devices to external sites, so only the firewall's http port will be open.

1.1 System description

At the heart of the IPCorder system is a hardware device that the user communicates with using its web interface. This means the user does not need to install any special software on his/her computer, a standard web browser is all that is required.

The system is designed to be a ***centralized digital security control system***. Its function is to centralize the management of digital security devices (cameras, sensors) and their data.

The system can automatically detect and configure most ***devices*** (provided the device is supported). The system management allows the number of devices to be restricted at any given moment. Section 2.3 describes the ***configuration of controlled devices***.

The system acts as a communication node, ***providing interaction and linking*** between actions of devices, which are not aware of each other. This means, for example, triggering video recording from an alarm signal (which the camera would not be aware of without the presence of some additional system), or turning lights on based on a specific event. Apart from the basic reactions (such as triggering video recording when motion is detected), which are set up directly in the device's settings (see Section 2.3.3), the interactivity between events is handled by a set of user-defined rules. Section 2.6 describes how they are entered into the system.

Storage of data is also managed by the system. The scenarios are entered, under which video should be recorded and for how long. The recordings are stored at a location in the central database, and can then be easily retrieved and reviewed. Sensor data can be ***exported*** in ***html*** table format, video and images from cameras can be downloaded into a file by a single click. Access to recorded data is described in Chapter 4.

The system displays ***live data*** from sensors in a unified way, independently from the given device. In contrast with traditional methods, where a separate browser window or separate program must be launched for each device, IPCorder allows outputs from multiple devices to be viewed simultaneously. First, the user selects a pool of devices, from which outputs are to be simultaneously monitored (defined as a 'View'), then this particular pool can be displayed. Views can be saved and edited, so there is no need to start at the beginning every time. Viewing live device outputs is described in Chapter 3.

1.2 System requirements

IPCorder is compatible with Microsoft Windows 2000, 2003, XP, Vista; Mac OS X 10.4 and 10.5 and Linux 2.6.

IPCorder supports SATA and SATA 2 hard disk types, the two types can be freely combined.

Using one of the following web browsers is mandatory for accesing the web interface: Mozilla Firefox version 2 or 3 (recommended), Internet Explorer 7 (for PC) or Safari versions 3.1 or 3.2 (for Mac). Each individual device requires various components in order to display its output in the browser – for example Sun JAVA RE 6 Update 10 or higher, is recommended for proper display of the output from video-cameras.

The viewing Java web applet Koukaadlo requires installation of MPEG4 plugin native libraries onto the client computer. In case the libraries are unavailable, the applet installs them automatically.

Required specifications of the computer the video is to be viewed on depend on devices used. A ***500MHz processor cycle*** quota and ***50 MB of memory*** should be allowed for viewing the output from a ***single camera*** with the 1Mpx resolution. A minimal recommend cofiguration is 2 GHz processor and 256 MB RAM. Heavy network loading should be expected during video transmission from the camera (or system) to the computer.

It is recommended that an ***NTP server*** be accessible from the network to which the system is connected, so that the system may synchronize its date and time.

Chapter 2

Management

2.1 Configuration

On the first start-up, IPCorder tries to obtain an ***IP address*** via ***DHCP***; if unsuccessful, the IP address defaults to *192.168.1.78*. If the IPCorder is in the same subnet as the PC the IPCorder is to be accessed from, it should appear in Network Devices (under Microsoft Windows).

If you are not sure with IP address of the IPCorder, you should use **IP Corder Discover Utility** – application for discovering IPCorder device on your network. You can find it on the supplied CD or download it from *http://updates.ipcorder.com/*. For correct running of IPCorder Discover utility Microsoft .NET 2.0 Framework is needed. Download for free from *http://www.microsoft.com/downloads/*. If the Discover would not find you IPCorder, switch off a firewall and try again.

After entering the IP Address of the IPCorder in a www browser's address bar (Mozilla Firefox or Internet Explorer, for example), a login screen will display (provided that the system has been installed properly – see the Installation Manual). The default password of the *admin* user (the administrator account) is *admin*.

On the first use, certain settings need to be entered, such as ***IP address***, ***time***, remote access, and ***user accounts***. These settings can be found from the menu ***Management***, ***Configuration***.

2.1.1 Network settings

In this section (Figure 2.1 on the following page) the parameters which determine how and where the application will be accessed on the local network can be set. If you are uncertain about any item please consult with your ***network administrator***.

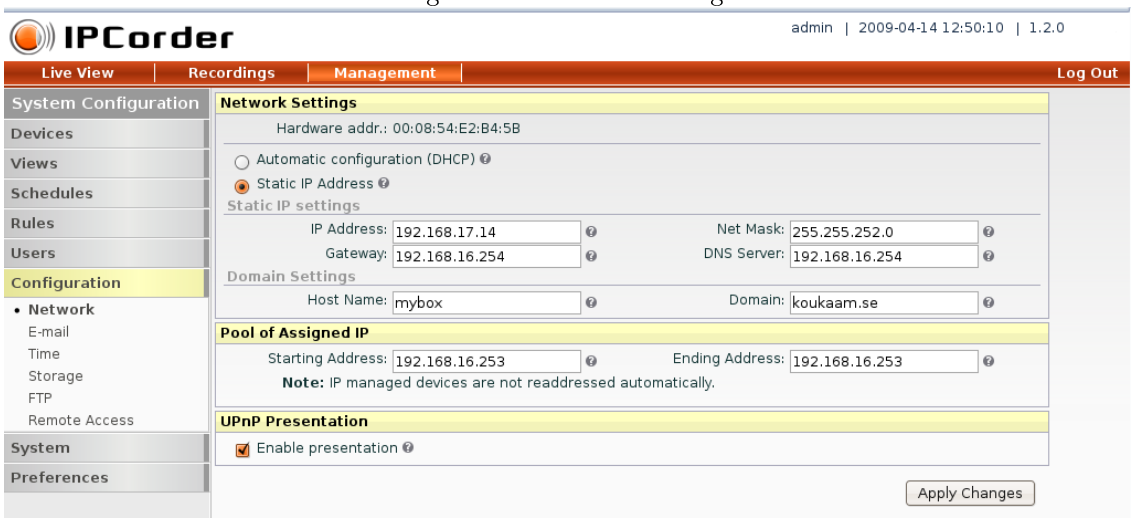
Meanings for each of the items are as follows:

- ***Automatic configuration (DHCP)*** – if DHCP (Dynamic Host Configuration Protocol) is selected then the IP address, subnet mask, gateway and DNS (Domain Name System) server settings will be ignored; the system will attempt to retrieve these settings from the central DHCP server

Static IP settings:

- ***IP address*** – the device will appear on the local network at this IP address
- ***Net mask*** – the local network to which the device belongs
- ***Gateway*** – IP address of the (gateway) device through which communication is directed to the internet and other external networks
- ***DNS Server*** – the server from which the application can request IP addresses based on DNS names

Figure 2.1: Network settings



Domain settings:

- ***Host name*** – DNS name for the computer, excluding the top level domain (e.g. from *koukaam.se* it is just *koukaam*). If it has no name, *localhost*, may be entered. For outgoing emails to be sent, it is of course necessary for the SMTP server to accept messages from a machine with such name
- ***Domain*** – top level domain under which the device will be assigned (e.g. from *www.google.com* it is just *com*). If no domain is assigned to the device, *localdomain*, can be entered. For outgoing emails to be sent, it is of course necessary for the SMTP server to accept messages from this domain

Pool of assigned IP:

- ***Starting / Ending adress*** – defines a range of IP adresses which will IPcorder assign to the devices under its management

Present like UPnP device:

- ***Enable Presentation*** – this option switches on/off the function of the IPCorder UPnP Presentation. That means the device will be seen from other computers in the folder Network Places in Windows system (with the assumption Windows are configured correctly)

Settings are confirmed by clicking the ***Apply changes*** button.

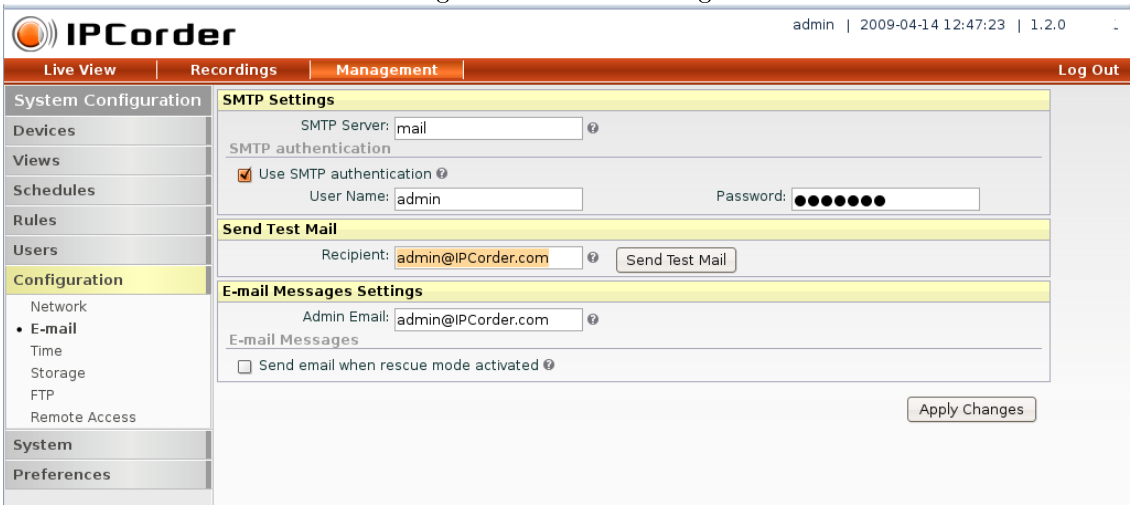
2.1.2 E-Mail

IPCorder is able to notify the user about different events via automatically generated e-mails. It also supports different national character sets, which means it is possible to use diacritic symbols in the notification e-mails. To use the notification e-mail system, it is first necessary to configure the parameters of the SMTP server. If you are not sure how to set it up, please contact your e-mail provider.

SMTP Settings:

- ***SMTP Server*** – Enter the address of the ***SMTP server*** for IPCorder's outcoming mail.
- ***Use SMTP Authentication*** – Tick the checkbox if the ***SMTP server*** you are using requires authentication.

Figure 2.2: SMTP settings



- ***User Name and Password*** – Insert the security data necessary for accessing the ***SMTP server.***
- ***Send Test Mail*** – This feature allows you to test if the SMTP configuration is working properly. Provide your email address in the Recipient field and press Send Test Mail button. You should receive the test message shortly. Otherwise, refer to the userlog in case a SMTP related error had occurred.
- ***Admin Email*** – Fill in the e-mail address the system status messages should be sent to.
- ***Send email when rescue mode activated*** – If this checkbox is ticked, IPCorder will automatically send notification to the admin e-mail address before switching into rescue mode.

Confirm the settings by pressing the ***Apply Changes*** button.

2.1.3 Time settings

In this form (Figure 2.3 on the next page) the method (and parameters) used to maintain the system's time can be set. The time set on the device is displayed at the right top corner of the form.

If the NTP method is selected (***allow NTP Synchronization***), the ***NTP Server*** should be entered, i.e., the ***IP address*** or ***DNS name*** of the device with which the system should synchronize its time (preferably a server which is always online). Finally, enter the ***Area*** and ***City***, where the application will be operating.

In case that no NTP server is accessible, ***enter*** the time ***manually*** (type the current time in the ***Date and time*** field). Alternatively, select the ***Synchronize with Computer*** option, which retrieves the time from the machine the user is accessing the application from.

Click on the ***Apply Changes*** button to confirm the settings.

Switch to summer time is automatic in accordance to time zone.

2.1.4 Storage settings

This page (Figure 2.4 on the following page) contains information about total disk capacity (***Total capacity***) and about currently avaiable free disk space (***Free space***). The button ***Configure RAID array*** allows changing the disk usage settings . IPCorder supports multiple array types, i.e. array types 0, 1, 5 and 10. This setting requires restarting the device to the rescue mode, which implies interuption of the recording process and disconection of all other users currently connected to the device.

Figure 2.3: Time settings

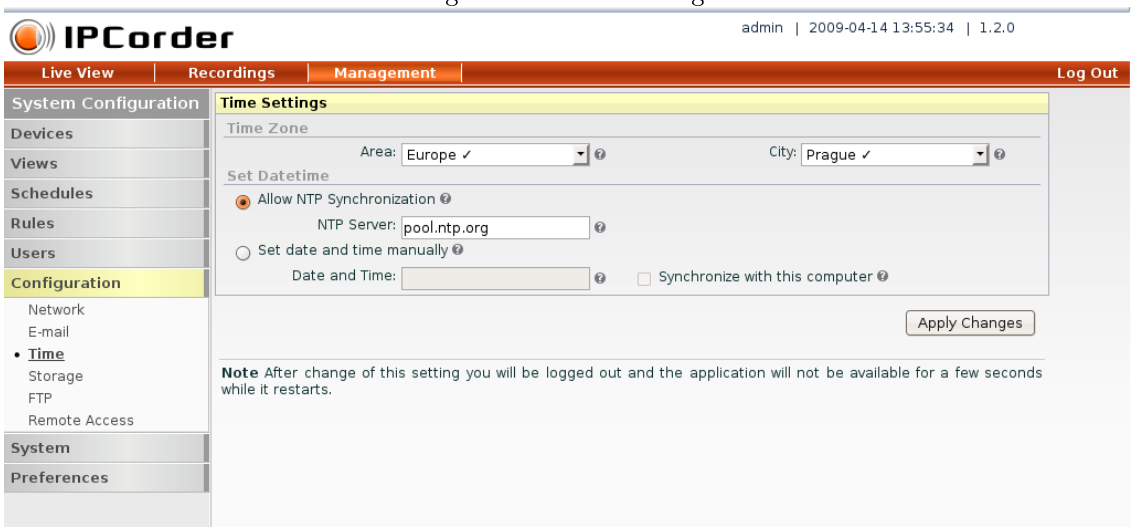
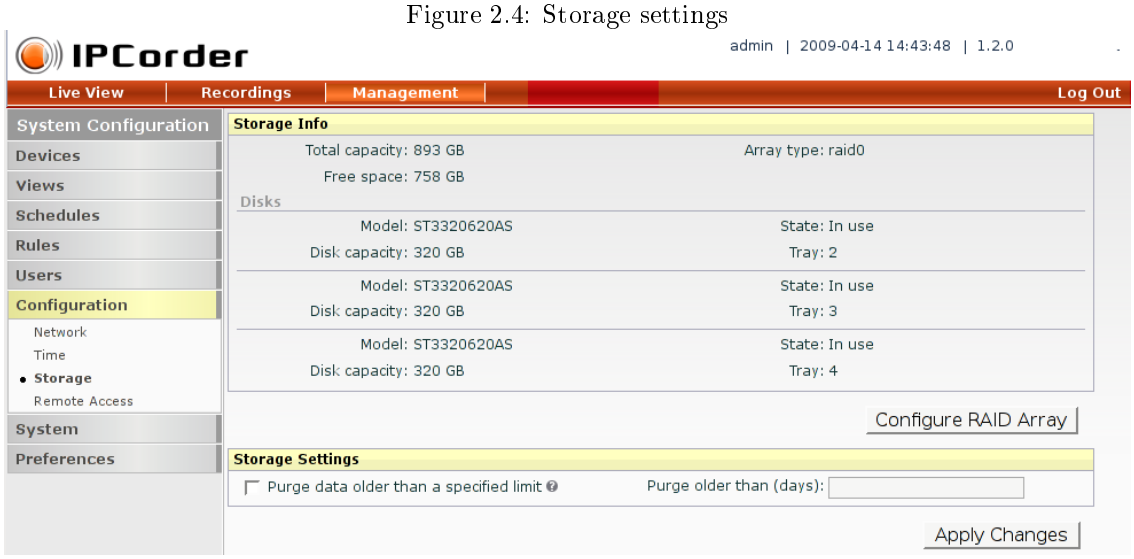


Figure 2.4: Storage settings



The system automatically monitors free space on the disk where data is stored. If space becomes significantly reduced, the oldest data will start to be erased until the available free space returns to a sufficient level.

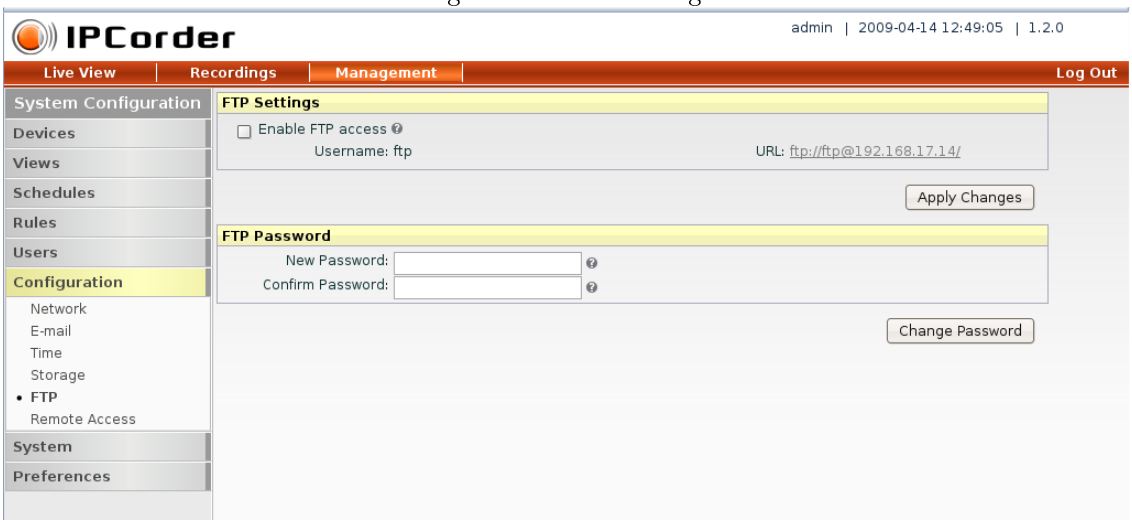
In case a check box ***Purge data older than a specified limit*** is checked, data older than specified will be removed automatically.

Click on the ***Apply Changes*** button to confirm the settings.

2.1.5 FTP

The data recorded by IPCorder can be accessed through FTP protocol, which allows easy downloading of large amounts of data. To enable FTP access, tick the ***Enable FTP access*** check box and click on the ***Apply Changes*** button to confirm the settings. The username for FTP access is ***ftp*** and the option for setting the password is available in the ***FTP Password*** section.

Figure 2.5: FTP settings



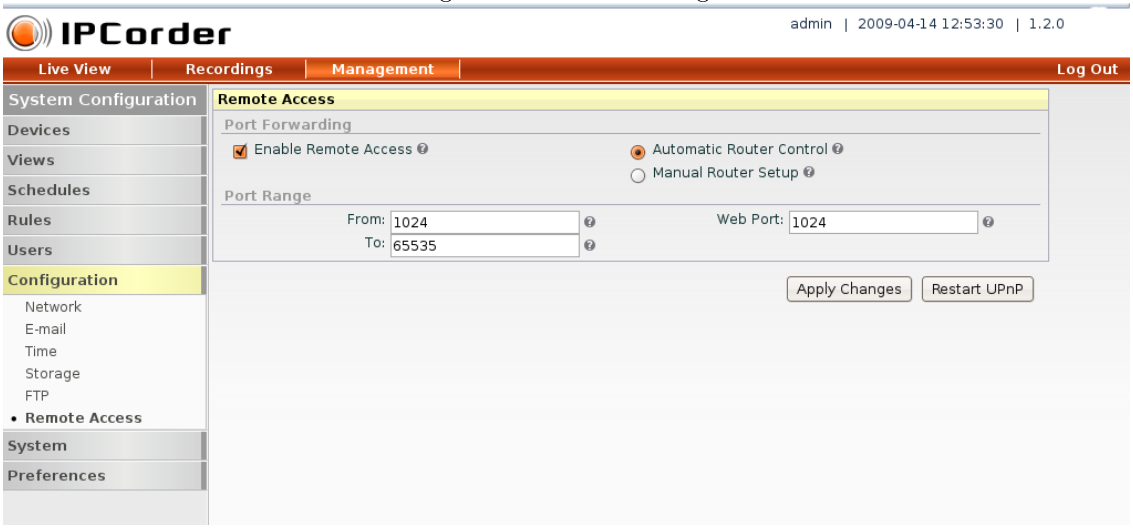
2.1.6 Remote access (UPnP settings)

If it is demanded the remote access to the IPCorder and cameras from other networks (e.g. using the Internet), it is necessary to set up the so-called ***remote access***. For the successful access to the IPCorder and cameras the IPCorder must be placed in the local network, where on the boundary of the local network and Internet there is placed a router (Internet Gateway) capable of address translation.

Whenever the remote access is demanded, we have to permit it by checking the option ***Enable Remote Access*** in the form. Further it is needed, with consideration of the router attributes, to choose one of two methods which provide the access.

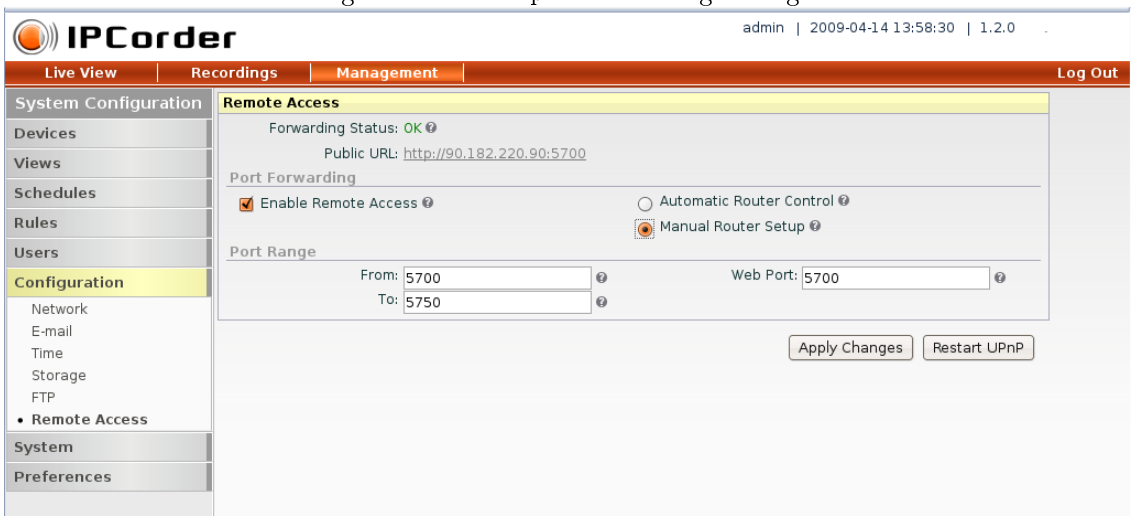
If the router supports the family of UPnP (or ***Universal Plug and Play***) protocols, the IPCorder can control the remote access dynamically, with no need of a manual set up. Thus the cameras are approachable only when the authorized user's watch them. In this case we choose the option ***Automatic Router Control*** at the upper part of the screen (2.6).

Figure 2.6: UPnP settings



The port through which the device is to be externally visible should be entered into the ***Web Port*** field. If our outgoing ***Internet gateway*** (to the public Internet) has address 194.114.132.12, and the ***Web Port*** is set to 1024, then the address for a web browser on an external site would be

Figure 2.7: Static port forwarding settings



http://194.114.132.12:1024 (this is displayed as a link labeled *Public URL*). The ***Port Range*** is the space, in which the application will attempt to allocate ports through the gateway for access to controlled devices. The ***From*** and ***To*** values are inclusive. The ***Web Port*** must lie within this range.

If the router does not fully support UPnP protocol, it is possible to make device accessible through static settings.

For this case an option ***Manual Router Setup*** is provided (Figure 2.7). The meaning of ***Port Range*** and ***Web Port*** is the same as above. An IP address on which the device will be visible on Internet is required to fill in ***Public Router IP*** field.

After applying changes a table with router (Figure 2.8 on the facing page) settings is generated. It is possible to print in on screen by clicking on ***Print Static Tunnels*** button.

The content of field is this:

- ***Timestamp*** – time of last change in settings. It is recommended to check it always when a settings of IPCorder is changed, a camera added or camera network setting changed. It is necessary for router to be synchronized with the most recently updated table.
- ***Device*** – name of the device (camera), for which is required to make a translation record.
- ***IP address*** – address of the target device, where data are sent. It is often labeled as *Target IP address* on routers.
- ***Target/To port*** – port on device where data are re-sent. Together with IP address thay provide the final destination of data. On routers it is often called as *Target port* or *To port*.
- ***Protocol*** – protocol on IP base which is used. On routers it is often called as *Protocol*.
- ***Source/From port*** – port on the outside side of router (gateway) where data should be re-sent. It is port from defined range. On routers it is often called as *Source port* or *From port*.

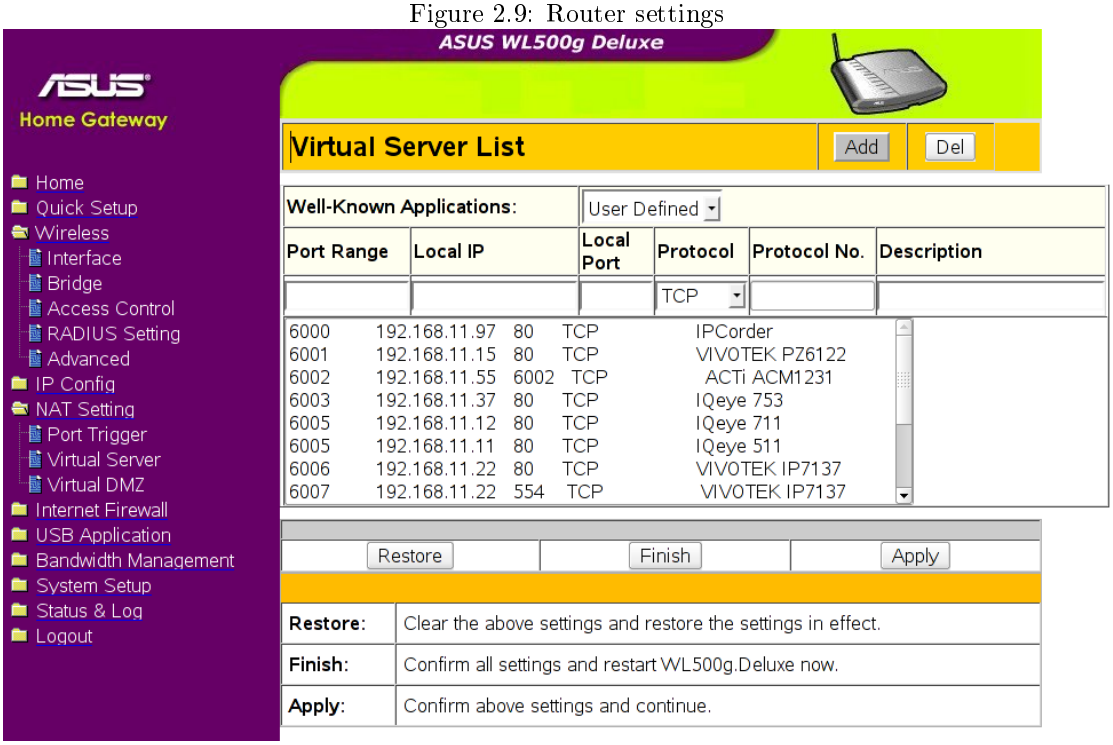
The data from this table must be entered in router settings of *port forwarding* or *NAT* (for example using the router Asus WL500g the final setting will bee similar to Figure 2.9 on the next page) and also must be updated, in correspondence with settings of IPCorder.

If you are uncertain about any of these settings, please consult with your ***network administrator***.

Figure 2.8: Table of forwards

Timestamp	2008-7-14 11:42:07			
Device	**IP Address**	**Target Port**	**Protocol**	**Port on Gateway**
IPCorder	192.168.11.97	80	TCP	6000
VIVOTEK PZ6122	192.168.11.15	80	TCP	6001
ACTi ACM1231	192.168.11.55	6002	TCP	6002
IQeye 753	192.168.11.37	80	TCP	6003
IQeye 711	192.168.11.12	80	TCP	6004
IQeye 511	192.168.11.11	80	TCP	6005
VIVOTEK IP7137	192.168.11.22	80	TCP	6006
VIVOTEK IP7137	192.168.11.22	554	TCP	6007
VIVOTEK PT7137	192.168.11.103	80	TCP	6008
VIVOTEK PT7137	192.168.11.103	554	TCP	6009
VIVOTEK IP7137	192.168.11.102	80	TCP	6010
VIVOTEK IP7137	192.168.11.102	554	TCP	6011
VIVOTEK PT7137	192.168.11.28	80	TCP	6012
VIVOTEK PT7137	192.168.11.28	554	TCP	6013
IPCorder	192.168.11.97	1567	TCP	6014
Sony PTZ	192.168.11.53	80	TCP	6015

Figure 2.9: Router settings



2.2 System

This section contains options as for actualization a firmware of the IPCorder so for restoring a factory settings of the device. Moreover it offers the description of a system log and possibility to restart or switch off the device.

2.2.1 Switching off / Restarting

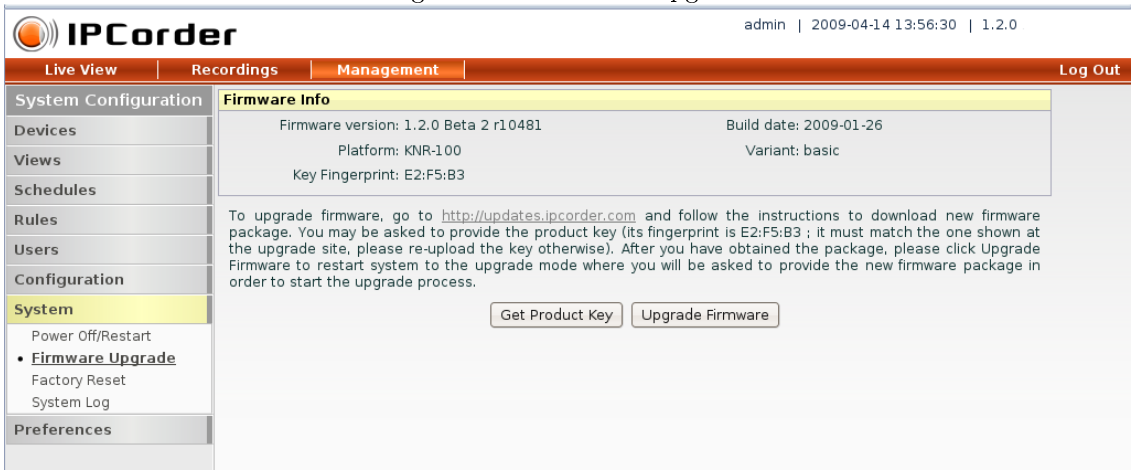
In the event that the device needs to be switched off or restarted, the ***Power Off*** / ***Restart*** buttons can be found by selecting the appropriate option in the ***Configuration*** menu, ***System***. (Figure 2.10). LEDs on the device indicate its current status (see the Installation Manual).

Figure 2.10: Power Off, Restart

2.2.2 Firmware upgrade

To upgrade the device's firmware it is first necessary to obtain a product key (Figure 2.11) by clicking the ***Get Product Key*** button on the firmware upgrade page, accessed from the configuration menu; the key is needed to generate the new firmware. The latest firmware is always available at *http://updates.ipcorder.com*. THE FIRMWARE IS UNIQUE FOR EACH DEVICE. IT CANNOT BE USED ON OTHER DEVICES. On the ***Configuration, Firmware Upgrade*** page, when the ***Upgrade Firmware*** button is pressed the firmware is loaded onto the device in a special ***rescue mode***. For a complete description please refer to the ***installation manual***.

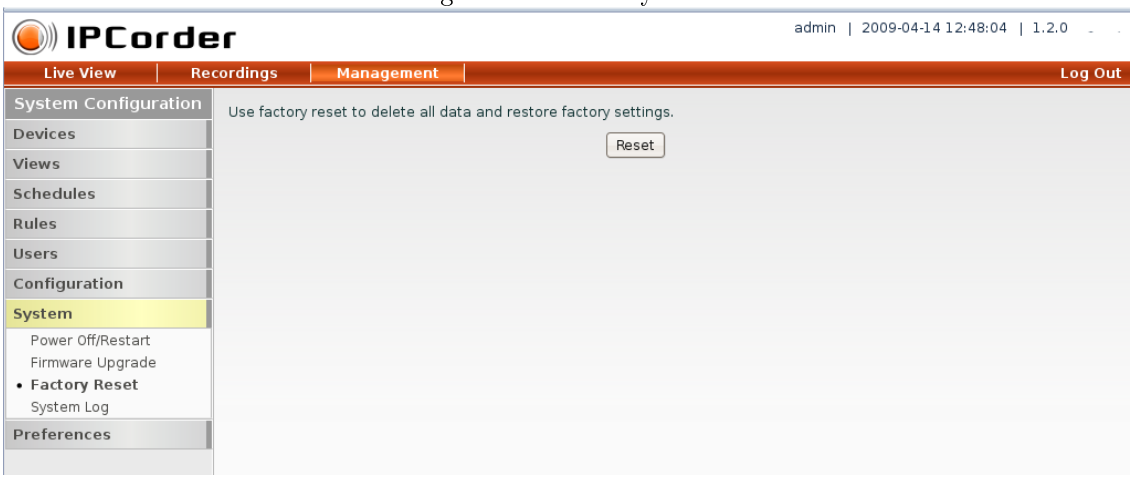
Figure 2.11: Firmware upgrade



2.2.3 Factory settings

The device can be switched to rescue mode and reset back to its factory settings (Figure 2.12). The exact procedure for performing a factory reset is hardware dependent and described in the ***installation manual***.

Figure 2.12: Factory reset



2.2.4 System log

For detailed control of the device's function it is possible in the menu ***Configuration***, ***System*** open the ***System log*** (Figure 2.13 on the next page). This you can ***Update*** or ***Delete*** using proper buttons.

2.3 Devices

The system is able to control and synchronize various device types, usually cameras and sensors (thermometers). The range of devices supported by the system is given by installed firmware version (it determines which drivers will be installed into the system).

Only a user with ***Administrator*** privileges can work directly with the devices and their settings.

2.3.1 Detection

In order for the system to work with the device, it needs to be aware of it and have it configured.

If the devices are connected to the same network segment, and are active, they can be automatically detected. In the ***Management*** menu, select ***Devices*** to search for new devices. Select the subheading ***Discover*** and click the ***Discover*** button in the window.

After a moment, the system will display all devices, which have not yet been added to the system (Figure 2.15 on page 17). Control of these devices can now be passed to the application by selecting the ones that are required (click the appropriate ***Activate*** check box) and entering their basic parameters.

The ***Device name*** is the required item. It is the name which users will see displayed for this device. This may contain spaces and diacritic characters.

If the ***IP managed*** option is ticked the device will be assigned an IP address from the range set in section Section 2.1.1.

If secure password access to a camera is desired, the ***Device is password protected*** box should be ticked and the camera's current username and password entered. Devices are added to the system when the ***Activate*** option is clicked. The password can be generated automatically

Figure 2.13: System log

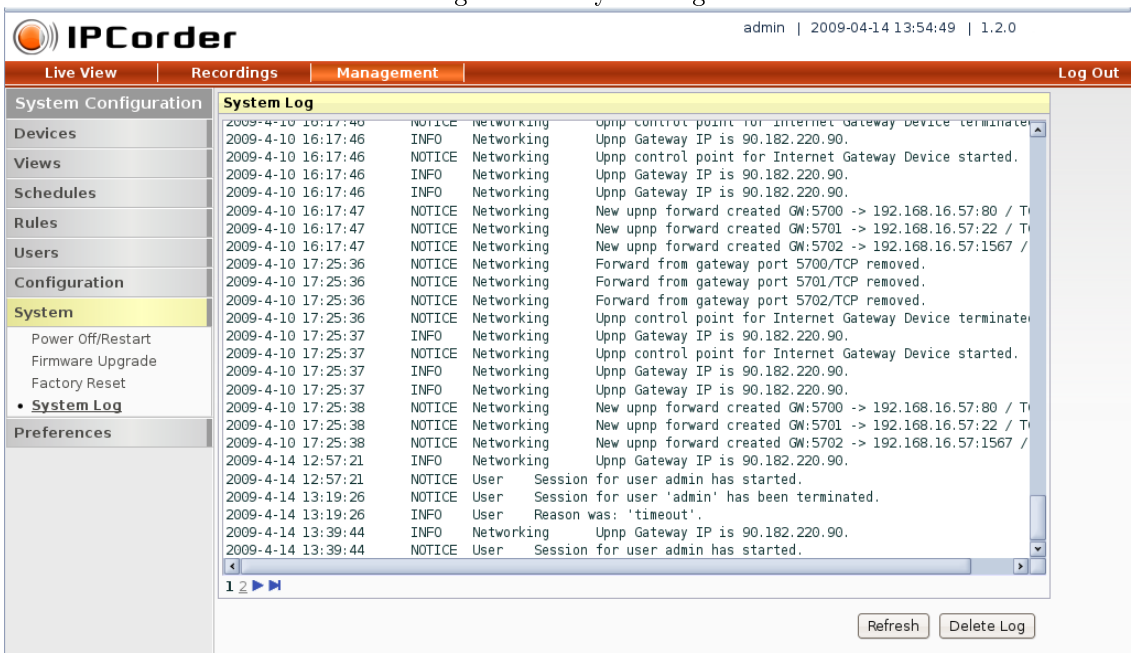


Figure 2.14: Device detection

by ticking a field ***Generate new password***. The generated passwords can be printed later using a link ***Print Credentials*** from the menu.

2.3.2 Manual Entry

If the device is unreachable (e.g. on a different network), it can be entered manually. Manual device entry is selected from the same menu as automatic entry (***Management***, ***Devices***, using the ***Add Manually*** link. A form (Figure 2.16 on the next page) with fields for basic device identification will appear.

Again, the ***Device Name*** field is shown, as well as the ***Authentication settings***. The device's ***IP address*** and its ***Type*** are also required.

If we want to add only one device, we can confirm the values entered by clicking on the ***Activate*** button. If further devices are to be entered the ***Add Next*** button should be clicked.

Figure 2.15: New devices

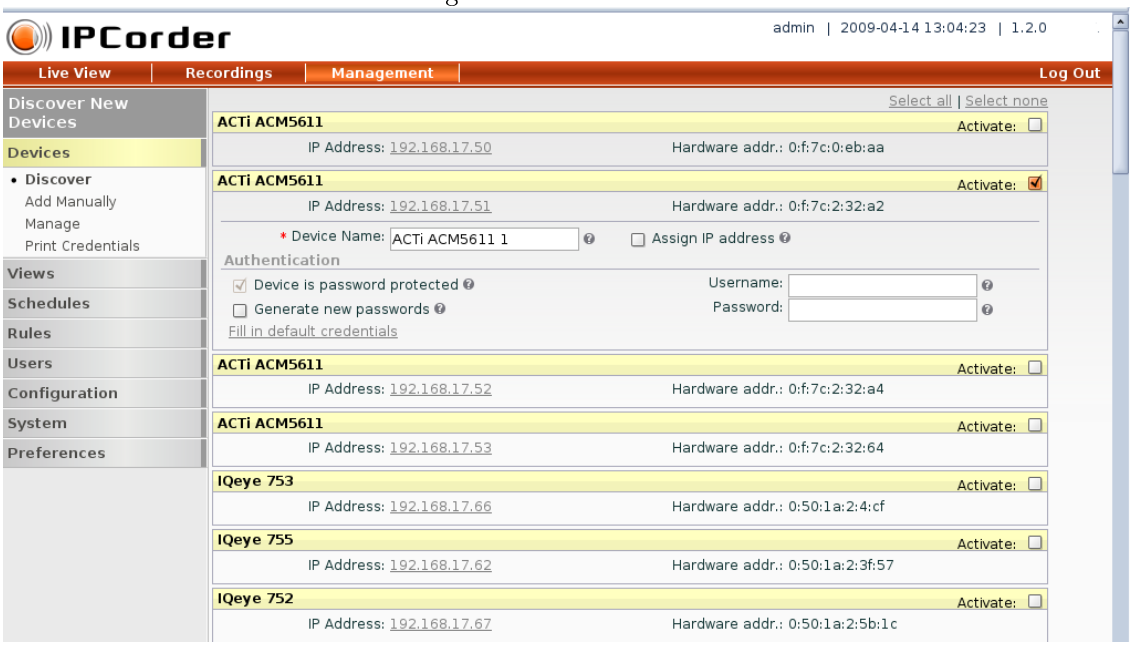
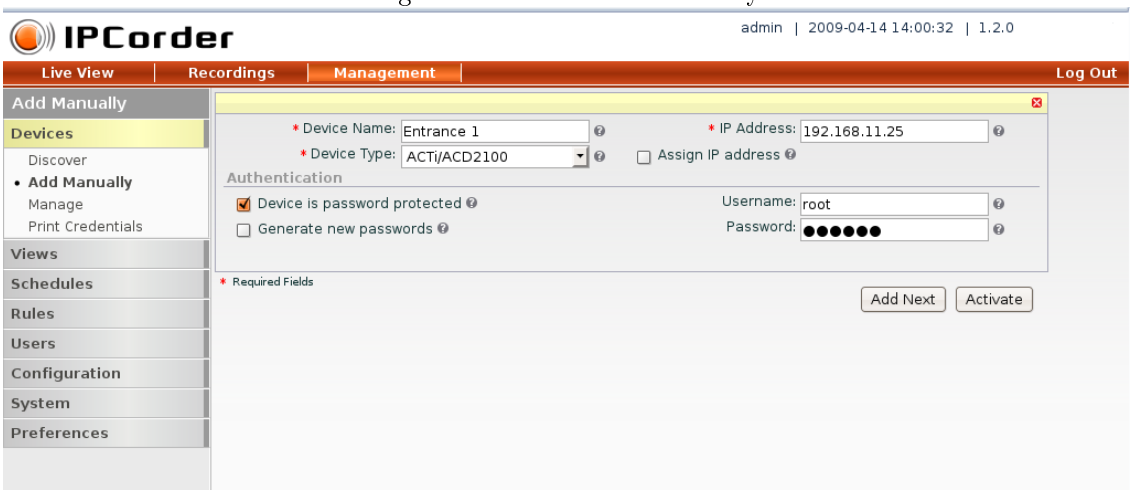


Figure 2.16: Manual device entry



2.3.3 Managing devices

Changes to device settings and camera recording modes are made by clicking ***Management***, ***Devices***, then ***Manage***.

When the appropriate device has been located in the list, click on ***Settings***.

The fields, which were originally set (Figure 2.15) when the device was entered into the system can be edited in the form now displayed, as well as the following "new" fields:

Network settings

- ***Authentication: Manage*** – manages users accounts to this device.
- ***Advanced settings: Device Web*** – specify behaviour of device more closely.

Video settings – displays the resolution of video and its format.

Figure 2.17: Device list

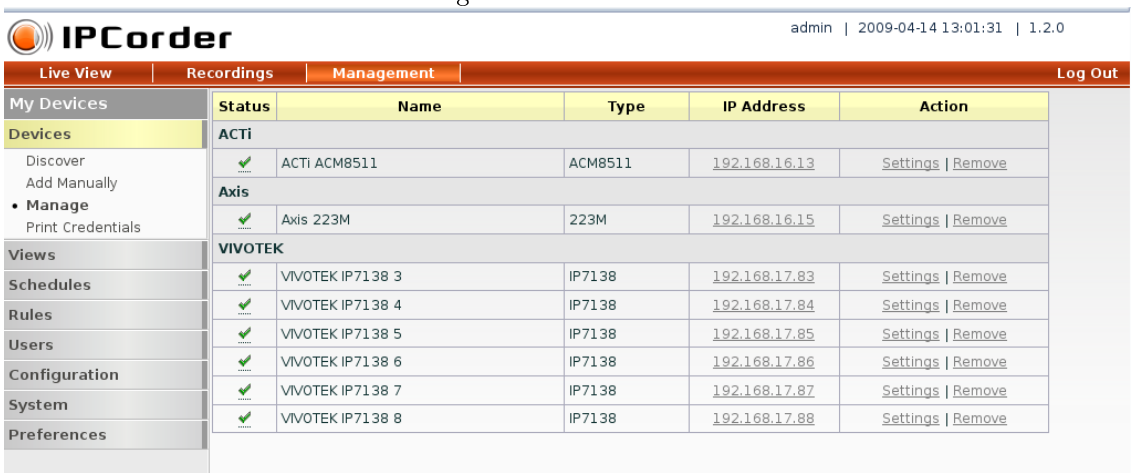
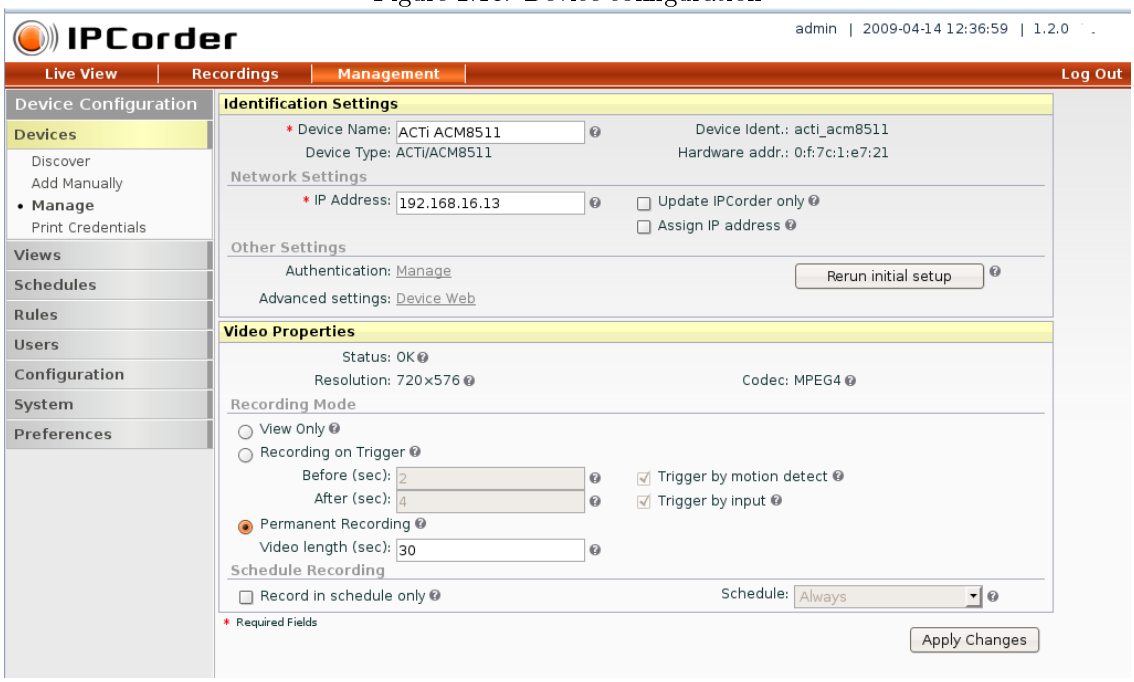


Figure 2.18: Device configuration



Recording mode – there are three modes in which cameras may operate**:**

- ***View only*** – the camera does not record, and no events are received from it (no reaction using rules is possible using the digital input from a camera in this mode). The camera will however display a live image in the views.
- ***Recording on trigger*** – the camera records whenever the specified event occurs. For every event occurrence, video recording will be triggered. The ***Before*** and ***After*** fields indicate how many seconds of video should be recorded before and after the event, respectively. Permitted range of the parameters is 0 - 4 seconds for the parameter ***Before*** and 0 - 60 seconds for the parameter ***After***, respectively. Two types of event may be selected:
  - ***Trigger by motion detect*** – video is recorded whenever the camera reports motion in a set detection window.
  - ***Trigger by input*** – video is recorded whenever the camera's digital input value changes.

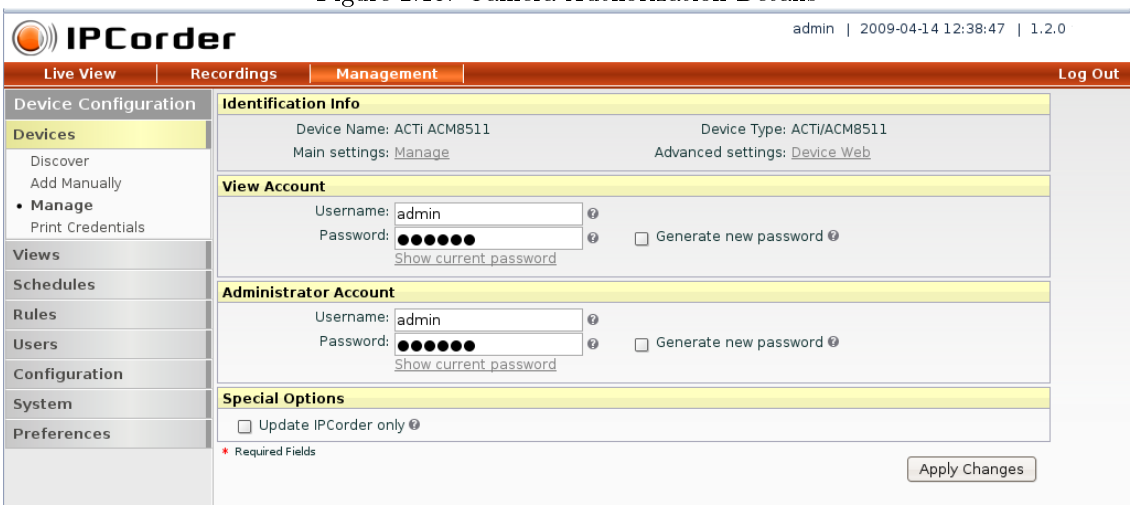
- ***Permanent recording*** – the camera continuously records video to files with the length set in the ***Video length*** field.

At the upper right corner of the form there is a field ***Device Ident.***. It contains very unique string generated from device's name which is used in rules definitions (Section 2.6).

The ***Authentication: Manage*** field allows access to the login details for the device. The following may be configured here (Figure 2.19), depending on the camera's properties:

- ***Enable Authentication***
  - ***Free Access to Camera*** if ticked, no security will be used when viewing the camera's images
- ***View Account*** – authorization details used when viewing the camera's images.
  - ***Username and Password***
  - ***Generate new password*** – the system will automatically generate a password for viewing
- ***Enable authentication***
  - ***Free view access*** – if this option is selected no authorization will be required for viewing the camera's output
- ***Special option***
  - ***Update IPCorder only*** – serves to set the device password internally in IPCorder, where the device's password has been set by another method
- ***Administrator account*** – authorization details used when configuring the camera
  - ***Username and Password***
  - ***Generate new password*** – the system will automatically generate a password for viewing
- ***Update IPCorder Only*** – for setting up passwords for any device enciphered besides the IPCorder

Figure 2.19: Camera Authorization Details



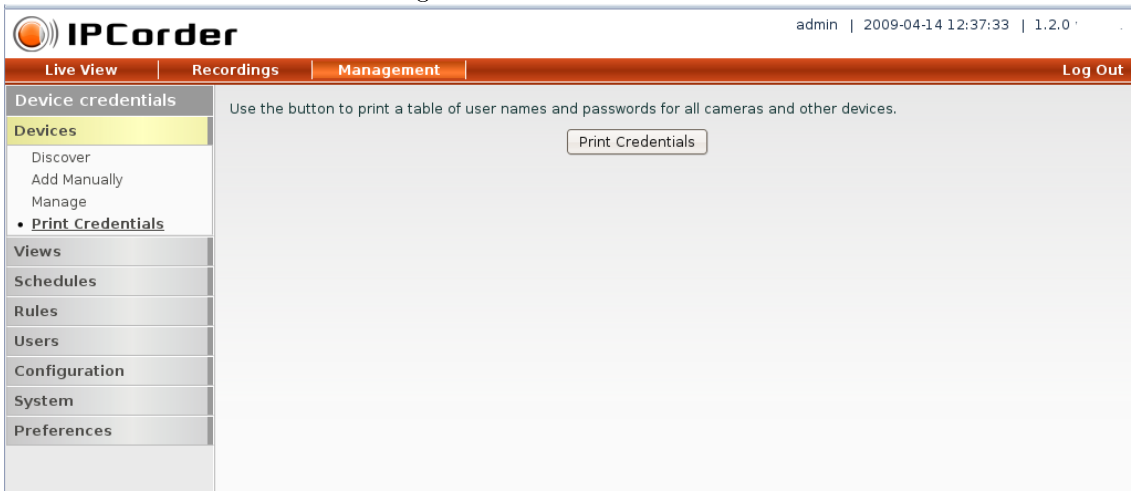
2.3.4 Removal

If, for some reason, a device needs to be removed from the system (e.g. has become damaged, redundant, ...) the ***Management***, ***Devices*** menu should be accessed and the ***Manage*** item selected. The list of devices registered on the system is displayed (Figure 2.17 on page 18). Select the ***Remove*** option for the desired device. The system will prompt for a confirmation of the action. If the removal was successful, the ***list of devices*** will be displayed again, but the removed device will no longer be listed.

2.3.5 Print credentials

For reference purposes, a device's authorization details can be printed out (Figure 2.20). The system will export a table of users and passwords for each registered device when the ***Print Credentials*** button is pressed.

Figure 2.20: Print credentials



It is recommended that all credentials be printed off once all the devices have been installed, and the information stored in a safe place.

2.4 Monitors

Only a user with ***Administrator*** privileges may access monitor settings.

Monitors are system objects, which represent individual device outputs (camera's picture, temperature, ...).

There are two types of the monitors:

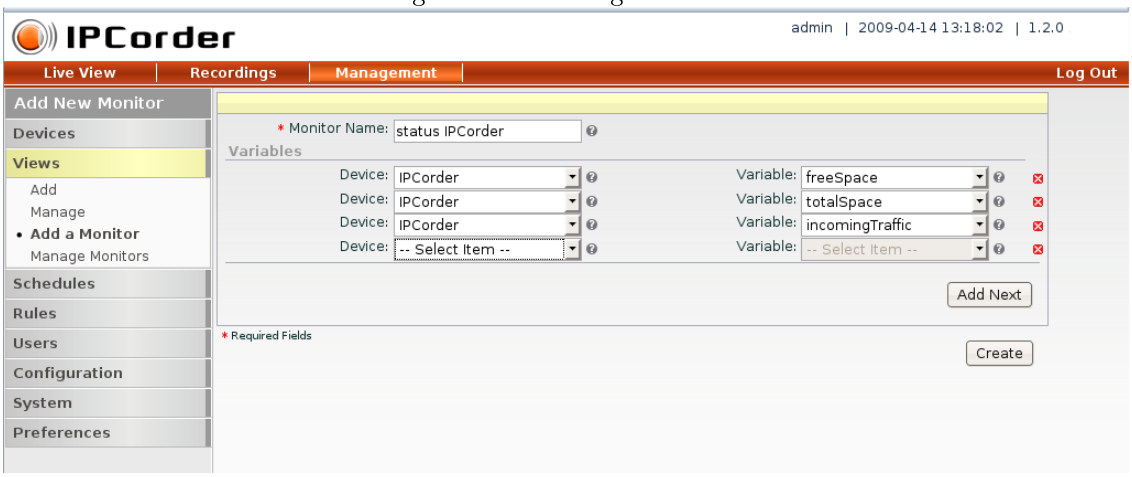
- ***Variable*** – defined by the user, they contain a list of sensors and system variables with their values.
- ***Live stream*** – these are monitors with camera images. The system always reserves one for each camera.

2.4.1 Adding

Variable monitors can be added through the ***Management***, ***Views*** menu under the item ***Add a Monitor*** (monitors with the ***live stream*** are implicit in the system and are static).

Every monitor must be assigned a ***Name***. The user must also select at least one ***Device–Variable*** pair. Variables for monitoring are added to the monitor by pressing the ***Add Next*** button; they are removed by clicking on the *X* at the end of the row where the variable is listed.

Figure 2.21: Editing a monitor

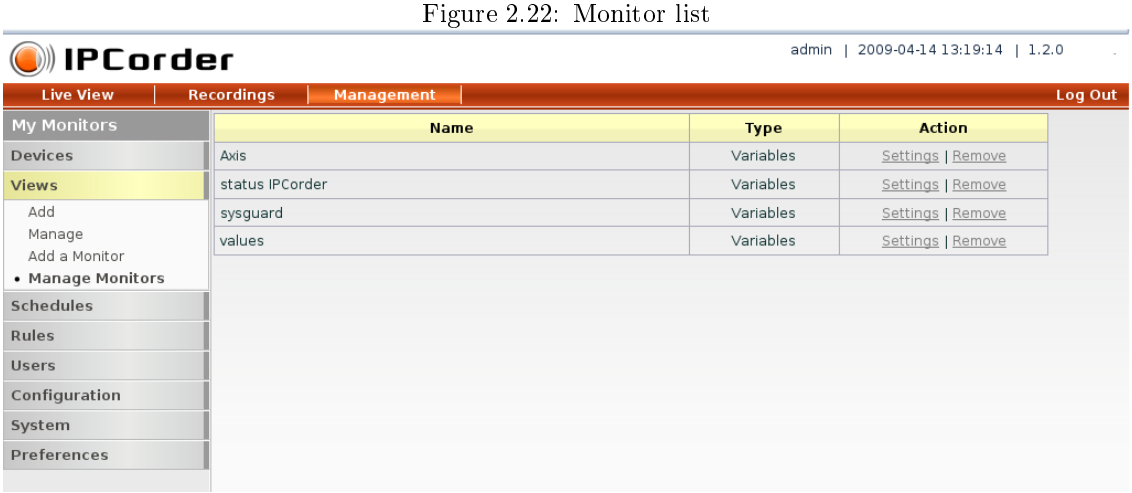


The monitor is created when the ***Create*** button is pressed.

2.4.2 Managing

The list of variables can be found under ***Management***, ***Views***, ***Manage Monitors***.

Figure 2.22: Monitor list



If a monitor's properties need to be changed (e.g. adding a variable), the ***Settings*** link should be selected in the appropriate monitor's row. The same form will be displayed as for adding a new monitor (see Figure 2.21).

Changes are saved by clicking the ***Apply Changes*** button.

2.4.3 Removing

An undesired monitor may be removed from the same menu as it is managed (***Management***, ***Views***, ***Manage Monitors***). Click on the ***Remove*** link at the end of the appropriate monitor's row.

2.5 Views

Views are user-defined groups of device outputs, which are convenient to view together in one browser window. A view is composed of ***monitors***, which are single device outputs (***camera***

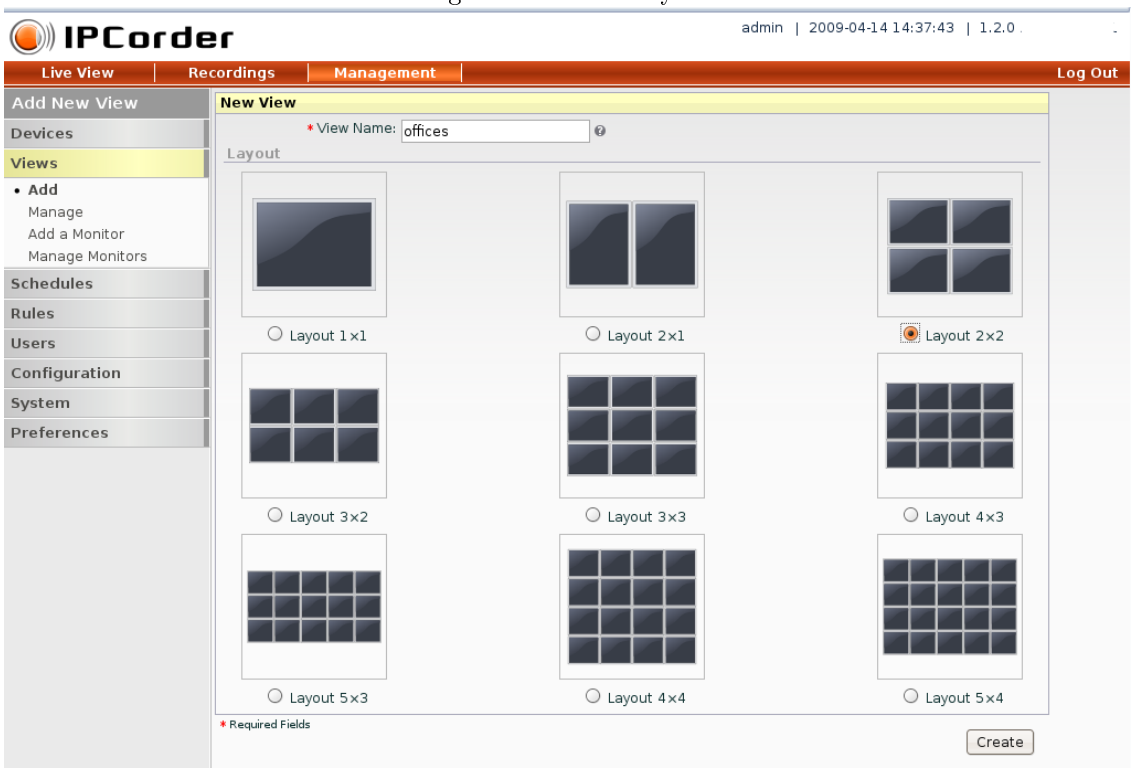
image, or ***sensor*** value). The number of monitors to be displayed, their layout and content will be defined by the Views.

Only a user with ***Administrator*** privileges or permission to configure Views and Monitors can access or change their configurations.

2.5.1 Adding

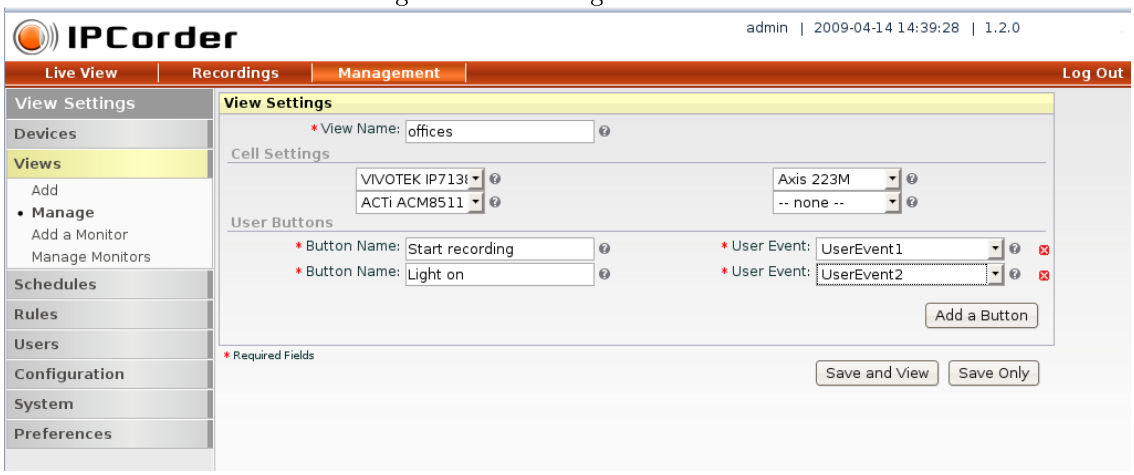
To add a new View select ***Management***, ***Views***, and the ***Add*** item.

Figure 2.23: View layout



On the first screen (Figure 2.23) a ***View name*** is entered for the View and its ***layout*** is selected. The layout defines the number of ***monitors*** in the View and their relative position on the page. When the ***Create*** button is pressed a second screen is displayed (Figure 2.24).

Figure 2.24: Setting View content



The content of each cell may now be selected, by assigning a monitor to it. The available selection is composed of the pre-defined ***live stream monitors*** and the user-defined ***variable monitors***.

It is also possible to assign buttons to each View, which allow signals to be sent to the system. These signals are evaluated in the rules, and various actions may be initiated (see Section 2.6). Each button must be given a name (label) and the signal it will send out when pressed must be defined. Buttons may be added by pressing the ***Add a Button*** button, and may be removed by clicking the *X* next to the button's settings.

If the ***Save Only*** button is pressed, the system will return to the View list. By pressing the ***Save and View*** button the system will save and display the changes.

2.5.2 Managing

If View settings need to be edited, the ***Manage*** item should be selected from the ***Management***, ***View*** menu.

Figure 2.25: View list

The list of existing Views is displayed (Figure 2.25). Each one has a ***Settings*** link, which allows its parameters to be edited. Only the content of individual cells and button settings may be edited for existing Views; the layout may not be changed. The configuration is the same as for creating a new View (see Section 2.5.1).

2.5.3 Removing

If a View needs to be removed, select ***Manage*** from the ***Management***, ***Views*** menu. The list of Views will be displayed (Figure 2.25). Click the ***Remove*** link for the appropriate View to remove it, and confirm when prompted.

2.6 Rules

Rules are simple but very powerful tools to determine the ***system's reaction to an event***. As a basic example, rules allow actions to be initiated such as: *If it is not Saturday or Sunday and the temperature drops below 20 degrees, send an e-mail to boilerroom@hotel.com.* Basically, an action is bound to an arbitrary event in the system. Event sets are dependent on ***devices*** that are connected to the system. For each device, its ***inaccessibility*** can be detected (device fault, network offline, ...). Cameras have events such as ***video recording***, ***change of a camera's state*** (triggering, reconnection) and ***motion detection*** (if the camera supports this). Sensors indicate events where there is a ***change of state***. For a list of events supported by individual devices see Table 5.3 on page 45.

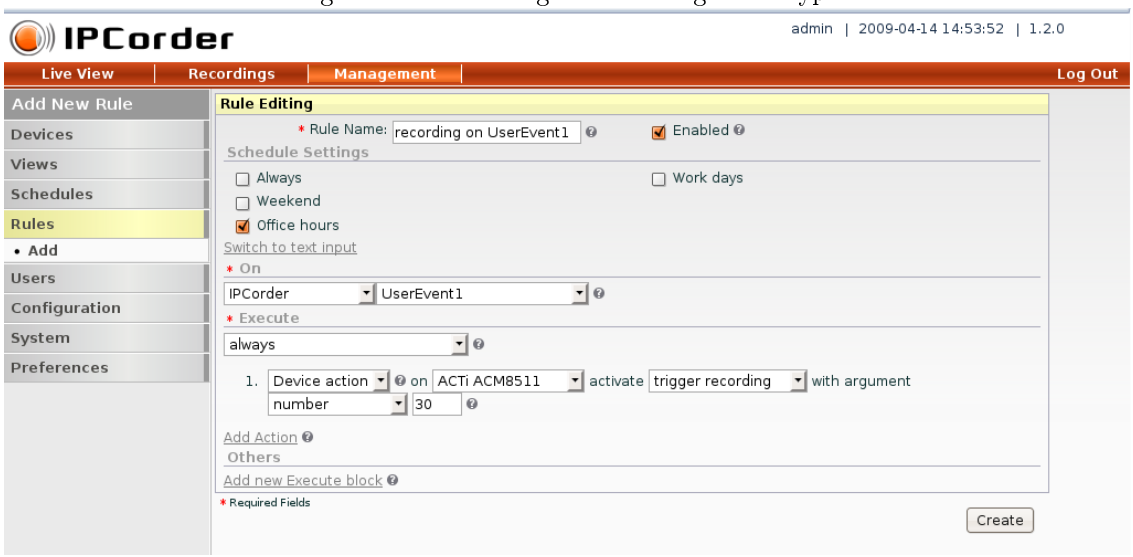
Simple rules can be entered by pointing and clicking in the form. More complex rules must be entered as text in the special rules language.

Viewing and configuring rules is only allowed for users with ***Administrator*** privileges.

2.6.1 Adding

Rules are added through the ***Management***, ***Rules*** menu under the ***Add*** item.

Figure 2.26: Selecting a rule's assignment type



- ***Rule Name*** is the name, which the user will see the rule displayed as.
- The ***Enabled*** check box is for easily deactivating the rule.
- The next section provides options for the schedules when the rule should be active (outside this ***schedule*** the rule is off). If no schedule is checked, the rule will be active regardless of schedules. For more on schedules see Section 2.7.
- In the On section choose and event, which should execute the rule (e.g. a pair camera-motion detected).
- What happen after the triggering event is defined by the so called Execute blocks.
- Every execute block allows the user to define a condition or a set of conditions and a set of actions to be taken when the conditions are fulfilled .
  - always - the simplest option. Such a block will be executed at every occurence of the triggering event.
  - when - allows to specify a simple condition for a system or device variable.
  - when (advanced) - besides the same functionality as when allows more complex conditions e.g. comparison of two system variables or working with user events.
  - when all of the following holds - allows for linking the conditions with AND. For the embedded contion the following is available:
    - simple - for a condition of the type when
    - pokročilá - for a condition of the type when (advanced)
    - all off - for another layer of conditions linked with AND
    - any off - for another layer of conditions linked with OR

  - when any of the following holds - allows for linking the conditions with OR . Types of the embedded conditions are the same as for the "when all of the following holds" variant.

- Implicitly two embedded conditions are generated, more conditions can be added by clicking the add condition link.

- In the next part the actions to be taken when a triggering event occurs and the conditions are fulfilled are defined. There are the following options:

  - Device action - allows to pick a device and an action it should perform , e.g. trigger recording (In order to start recording the camera has to be in the mode recording on trigger. The argument specifies how long video - in seconds - should be recorded.)
  - Send e-mail - displays a form for defining an email (to, subject, body)
  - Set variable - allows to define a user variable and set its value, which may be useful e.g. for testing this value in oter rules.
  - Wait - allows the user to define a delay before the execution of te next actions and blocks

- For adding another action to be executed the Add action button is available.

- Generally, this form allows for defining a rule that at the occurence of the triggering event examins several sets of conditions and based on their validity executes defined sets of actions.

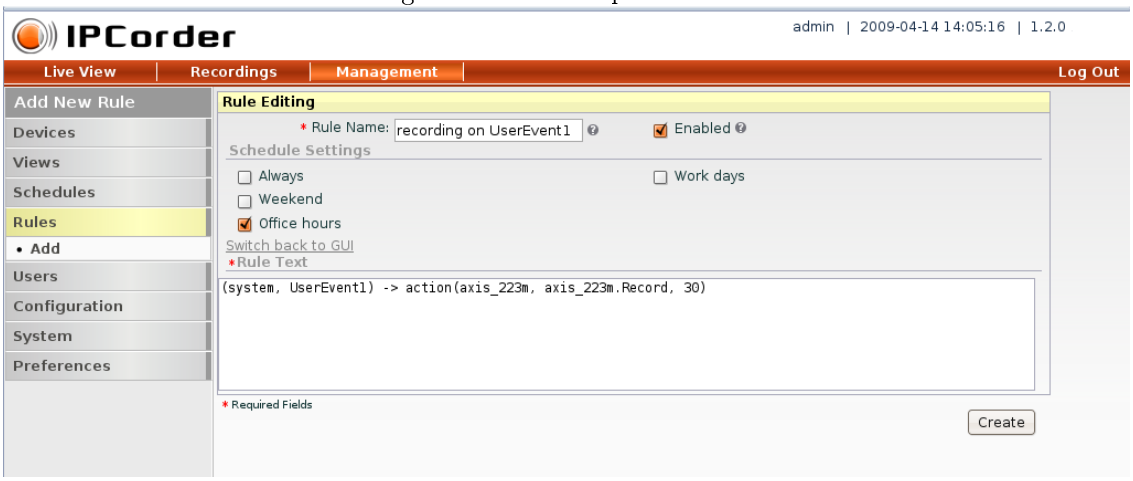
For advanced users an interface for editing rules is available - you can switch to it by clicking the "Switch to text input" link under the selection of schedules.

Text input for rules is defined as follows:

- As previously, the rule's ***Name*** must be entered, whether it is ***Enabled***, and its ***Schedule Settings***

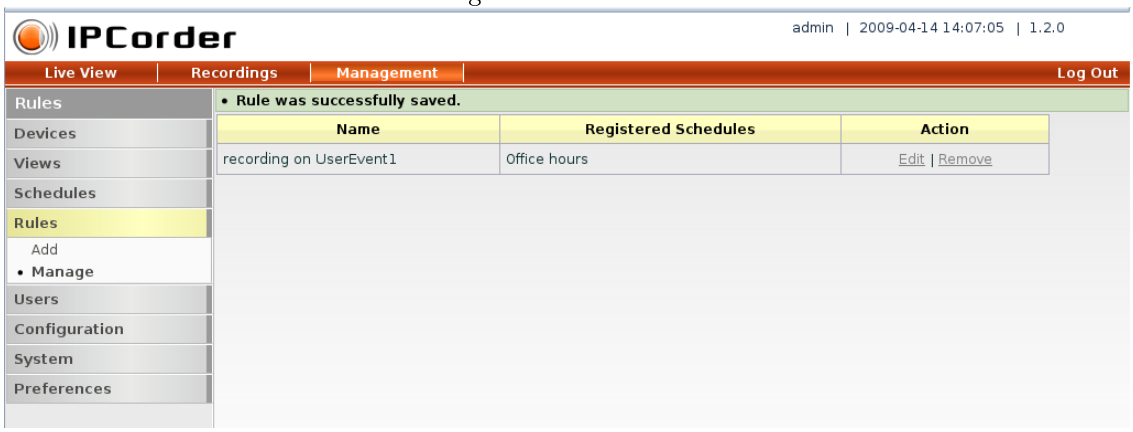
- The text part then must contain a full definition of the rule, including device identifiers, event names, and any relevant variables. The rule's format is described in Section 5.1.

Figure 2.27: Text input of a rule



In all cases, the rule entered is confirmed by clicking ***Create***.

Figure 2.28: Rule list



2.6.2 Managing

The list of rules is in the ***Management***, ***Rules*** menu under the ***Manage*** item. When there are no rules selected this item is invisible.

If the properties of a rule need to be changed (e.g. changing the email's text), the ***Edit*** link is selected for the appropriate monitor. The same form is displayed as for rule creation (see Section 2.6.1).

Changes are saved by clicking the ***Apply Changes*** button.

2.6.3 Removing

Undesired rules are removed by accessing the same menu as for managing them (i.e., ***Management***, ***Rules*** – ***Manage*** item). To remove a rule, the ***Remove*** link is clicked for the appropriate monitor.

If a rule needs to be removed only temporarily, there is no need to remove it from the system. It is sufficient to make the *Enabled* check box blank, by editing the rule's settings, or modifying the rule's Schedule Settings to match the required time periods.

2.7 Schedules

Schedules represent time periods within the week. They are used to define when ***rules*** are applied and the recording intervals for cameras. One important use is, for example, to separate time between working hours and non-working hours on the monitored premises. Which can be used profitably for recording on motion detection only outside working hours and thus record only relevant footage.

Setting and viewing schedules is only possible for users with ***Administrator*** privileges.

2.7.1 Adding

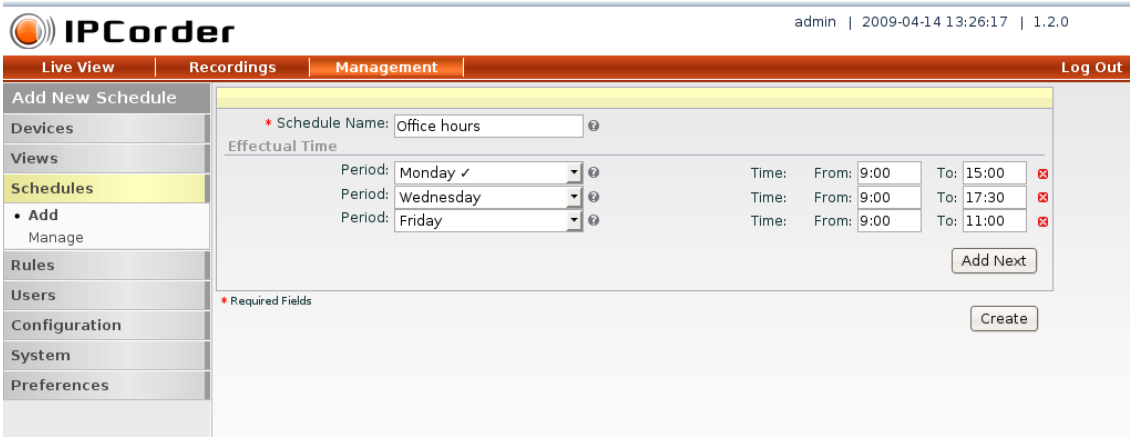
Schedules are accessed through the ***Management***, ***Schedules*** menu, by clicking the ***Add*** item (Figure 2.29 on the facing page).

Each schedule must be assigned a ***Schedule Name***, which will be used to identify it in the other parts of the application, and the active ***Period*** for each day it should operate. The ***Add Next*** button allows additional periods to be specified. Periods may be removed be clicking the*X* against the appropriate period.

If two or more intervals (maximum number is twenty) are required on a single day, each interval needs to be entered as a separate item. For example, if we require an active period on ***Monday*** from *8am* until *12am*, and then from *1pm* until *6pm*, two rows must be entered; one will be for the ***Monday*** period from *8am* until *12am*, and the second for ***Monday*** *1pm* until *6pm*.

The schedule is saved by clicking the ***Create*** button.

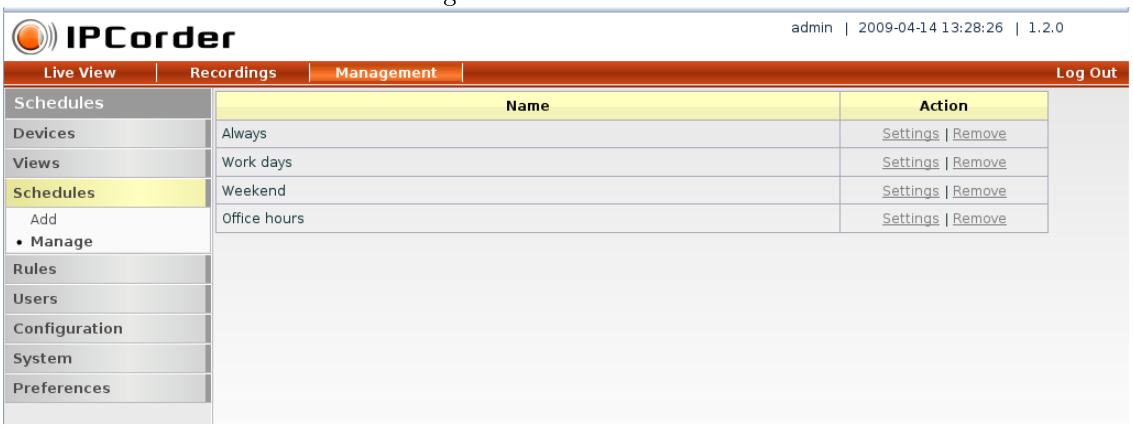
Figure 2.29: Editing Schedules



2.7.2 Managing

The list of schedules is accessible through the ***Management***, ***Schedules*** menu under the ***Manage*** item.

Figure 2.30: Schedule list



Next to each schedule is a ***Settings*** link, for editing that schedule's properties. Clicking on the link will display the same form as for creating a new Schedule (2.29). Changes in the settings are saved by clicking ***Apply Changes***.

2.7.3 Removing

To remove a schedule select the ***Manage*** item from the ***Management***, ***Schedules*** menu which is again invisible if no schedules are selected. All existing schedules are listed here (Figure 2.30). A schedule is removed by clicking on the ***Remove*** link for the appropriate schedule.

2.8 Users

The application allows each user to hold an independent account. Each user has their own ***password***, ***language settings***, setting for how ***units*** are displayed, and not in the last row each user's ***permissions*** for accessing individual system functions can be defined.

2.8.1 Types and permissions

For simplicity, the system offers basic grouping of users into ***Administrators*** and ***Users***.

Users may at any time monitor the current status of a device in the Views, and set their own preferences. They may also have permission to browse ***history***, manage ***Views*** and ***Monitors***, and have ***remote access*** from other networks.

Administrators have all the same permissions as users, but are also able to manage user accounts and the system itself (***Devices***, ***Views***, ***Rules***, , ***system settings***).

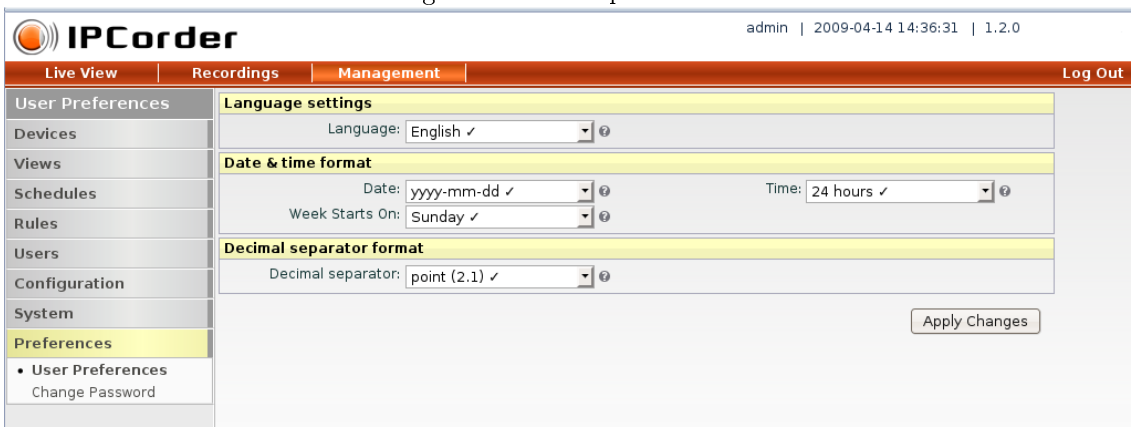
2.8.2 User preferences

All users have their own user preference settings, as well as their own password. In particular, the options allow the ***language settings*** for the program's user interface to be set. The ***decimal numbers format***, ***date format*** and ***starting day of week*** may also be set.

These settings may only be altered for the user's ***own account*** (under which he/she is currently logged in).

Changes are made by selecting ***Preferences***, ***User Preferences*** from the ***Management*** menu (Figure 2.31).

Figure 2.31: User preferences



Press the ***Apply Changes*** button to confirm any changes.

2.8.3 Adding

Only ***Administrator*** accounts allow new user accounts to be created.

To add a new user account, the ***Users*** item is selected from the Management menu, the ***Add*** item is then selected.

Figure 2.32: Adding a user

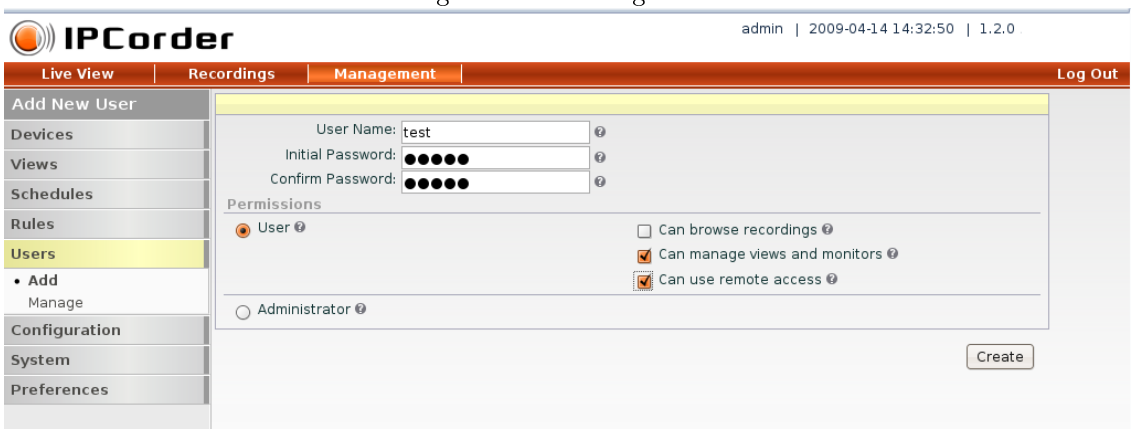
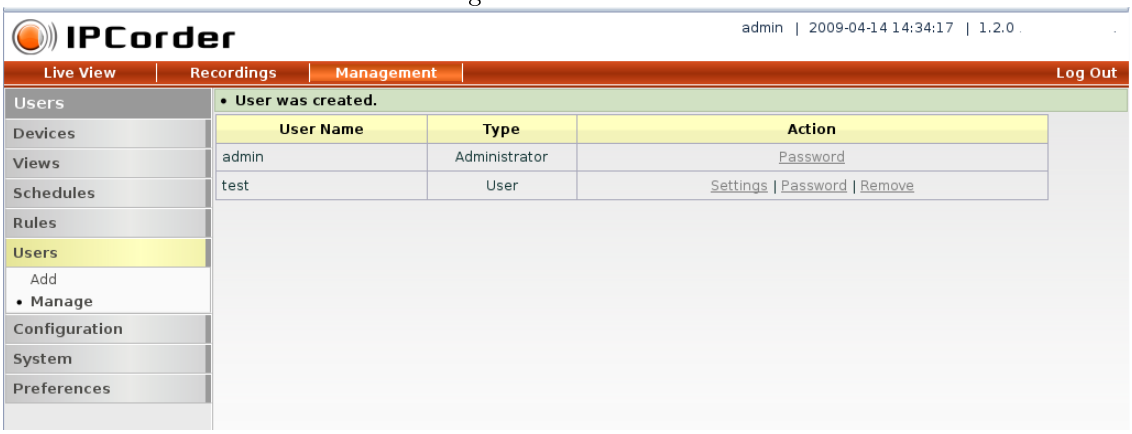


Figure 2.33: User list



The ***username*** and ***password*** (twice for verification) are entered. The ***user account type*** and ***permissions*** are then selected.

Everything is confirmed by clicking the ***Create*** button. The system will then display the list of users, showing any changes.

2.8.4 Changing settings

Permission changes for a particular user's account may only be carried out by a user with ***Administrator*** privileges. Preferences may be set by the user in the ***User preferences***.

To make changes to a user account, select the ***Users*** item from the ***Management*** menu. The list of ***users*** will be displayed(Figure 2.33).

Select the ***Manage*** option and click on the ***Settings*** link for the appropriate user.

The same form appears as for ***Adding a User*** (Figure 2.32 on the preceding page), but without the option to set the ***username*** and ***password***. Once the desired changes have been made confirm using the ***Apply Changes*** button.

The system will confirm the action and display the list of users.

2.8.5 Changing password

A user may change their own password in their ***User preferences*** (Figure 2.31 on the facing page). To change password select the ***User preferences*** item from the ***Management***, ***Preferences*** menu. Select ***Change Password*** then enter the old password once, followed by the new password twice.

If a user's password is forgotten, it may be changed from an ***Administrator***'s account. Through the ***Management***, ***Users*** menu, select ***Manage*** (Figure 2.33). For the appropriate user, click on the ***Password*** link and enter the new password twice. Click the ***Set Password*** button to confirm.

2.8.6 Removing

A user account may only be removed by an ***Administrator***.

To remove a user account select the ***Users*** item from the ***Management*** menu (Figure 2.33).

Select the ***Manage*** item and click the ***Remove*** link for the appropriate user account. The removal must then be confirmed.

Following confirmation the list of users is displayed(Figure 2.33) and a message confirming the account's removal.

2.9 Switching off

In the ***Management***, ***System*** menu, the ***Power Off/Restart*** (Figure 2.34) item allows the device to be correctly switched off/restarted. For complete turning off the device it could be necessary (in dependence on the type of the device – see ***Installation Manual***) to disconnect it from the power supply.

Figure 2.34: Restart

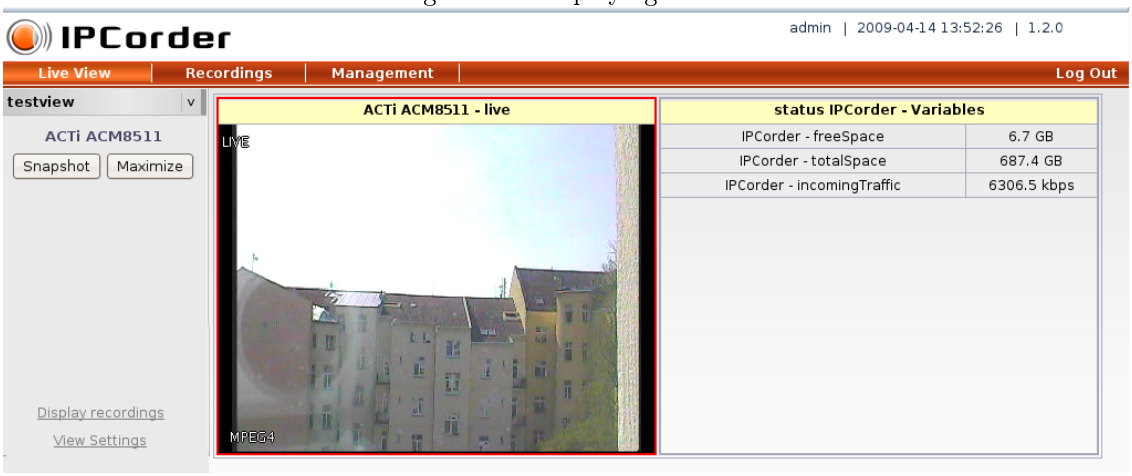
Chapter 3

Live View and live data

The application allows multiple device outputs to be viewed simultaneously, so there is no need to have a separate browser window open for each camera. This method of viewing multiple device outputs in a single window is what ***views*** are about. Of course, they must first be configured in the ***Management***, ***Views*** menu (see Section 2.5). Then they can be displayed from the top ***Live View*** menu.

First, the ***view*** should be selected from the menu at the top of the left sidebar (choose one from the list).

Figure 3.1: Displaying Views



After selecting a particular ***view***, it will be displayed on the right hand side, where the area is divided into individual ***cells*** according to the view's settings. Each cell displays the chosen ***monitor*** (see Section 2.4). These may be ***monitors*** showing a camera's live stream (as in the left hand cell), or ***variables monitors***, which contain a list of system variables (from sensors) and their current values (as in the monitor on the right).

At any given moment, there will always be one ***active*** monitor (highlighted with the red border). If the active ***monitor*** contains the ***live stream*** there are ***Maximize*** to enlarge the picture and ***Snapshot*** to save a frame from the camera's current output buttons depicted on the left. For a camera, which supports remote control, a set of ***control buttons*** will be displayed in the left sidebar. Depending on the type of camera, the buttons might be for ***swiveling***, ***focus***, ***iris change*** and ***zoom***.

IQin Vision cameras have a ***picture zoom*** feature:

- ***Zoom in***: hold the left-hand mouse button down over the desired part of the image
- ***Zoom out***: press the right-hand mouse button

The ***user-defined control buttons*** are displayed in the bottom left-hand corner. This buttons can be used profitably for operating barriers, lights, heating etc. However for their correct use it is necessary to study the rules language (5.1).

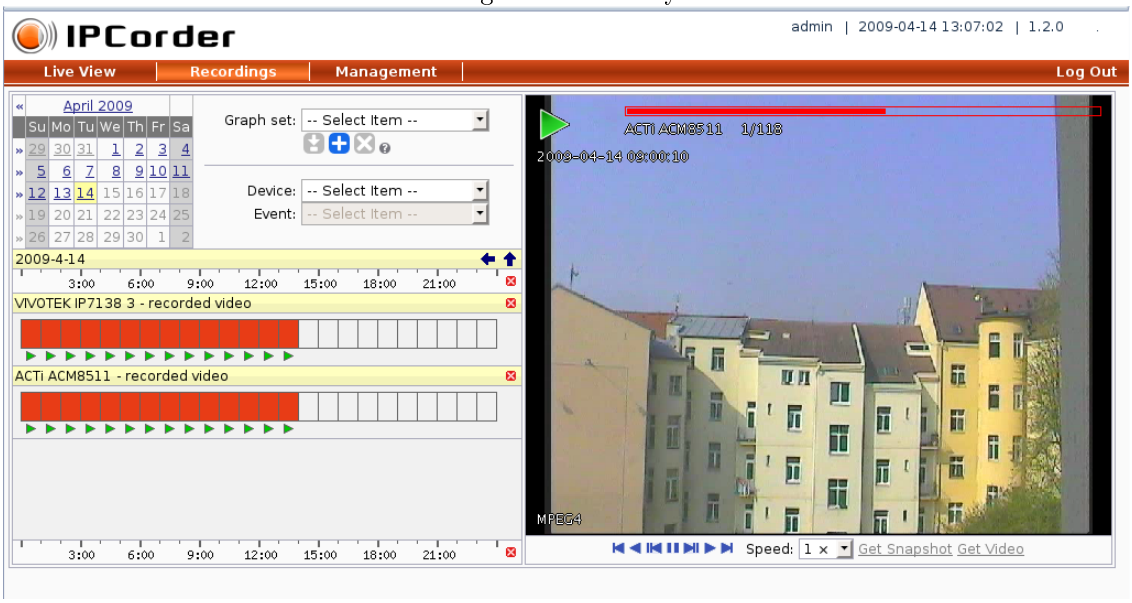
If the view's settings need to be changed, these can be accessed directly from the ***View settings*** link, located above the ***User Buttons***.

Chapter 4

Recordings

4.1 Viewing recordings

Figure 4.1: History



The system stores ***recorded video output*** on hard disk for later processing. According to the settings, it either records continuously or only if triggered by specific events (see Section 2.3.3). These recordings and search tools are accessible through the ***Recordings*** menu.

A calendar is displayed on the left, which allows selection of the time span to be searched. The ***day*** or the ***week*** (click on the arrow next to it), or the ***month*** (click on its name) may be selected. On the right-hand side, select the ***device*** and the ***event type*** (see 5.3) to be monitored. Once the selection is made, the statistics for that time period are displayed. Graphs for more than one event may be displayed. Undesired graphs may be removed using the *X* in the graph's title bar. All graphs may be removed by using the ***X*** on the right side of the time axis. The selected graphs constitute a ***Graph Set***. The button ***Add*** creates new set and activates dialog box for naming it. For saving changes and removing the set use buttons ***Save*** and ***Delete***.

Holding the pointer over a colored bar of the graph will display the ***time period*** it represents. For an event graph, the height of each bar represents the frequency of the event's occurrence. For a graph of values the bar represents the mean value over that time period.

The recording history can be navigated both with the arrows in the title bar of the graph (the ***left-hand arrow*** for the previous interval, the ***right-hand arrow*** for the next one, the ***up arrow*** to lengthen the interval (from an hour period to a day, and so on)) and by clicking on

a specific ***interval*** which causes a detailed record of events is displayed for that particular time period.

A green rectangle acting as a ***play*** button is displayed beneath the time intervals, which contain video. By clicking on it, the given interval's video content is replayed in the player window next to the graphs.

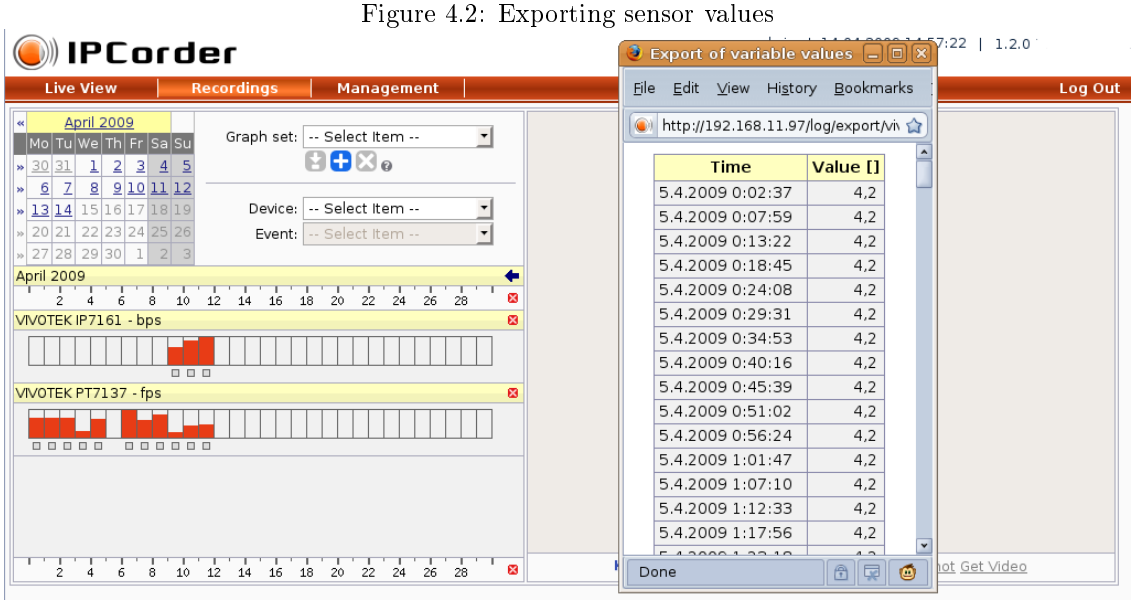
The player is controlled using intuitive buttons similar to the ones found on most applications of this type:

- > Play
- || Pause
- >| Next item
- |< Previous item
- >|| Next shot
- ||< Previous shot
- There is a menu to select the speed the video is played at

Zooming is possible here, in the same way as for live streams (see Chapter 3).

A grey rectangle is displayed beneath the time intervals, which contain sensor values. By clicking on it, a new window opens displaying the measured values from the sensor for that time period (Figure 4.2).The browser's settings must allow pop-up windows to be opened. Only a limited number of values are displayed in the window (maximum 200 items), so if the interval contains too many values the interval needs to be dropped a level to the next shortest time interval.

Figure 4.2: Exporting sensor values



4.1.1 Exporting video

The stored video can be downloaded using the recordings interface (Chapter 4). The *Get Video* link saves the current video to a file and the *Get Snapshot* link saves the current video frame as an image. The exported video can be played using FFDShow decoding and possibly some other filters. Easiest way to watch these videos is to play them in VLC player, which already contains needed filters. It is available for free download at `http://www.videolan.org/`. FFDShow filter itself

can be downloaded for example from `http://www.free-codecs.com/download/FFDshow.htm`. In case of using FFDShow your anti-virus (such as AVG) may happen to claim that FFDShow contains a trojan. However this is usually a false positive.

Chapter 5

Reference

5.1 Rules language

The purpose of "rules" is to allow decisions to be made (and actions to be taken) based on a sequence or combination of events. The basic concept is to test logical conditions, and carry out a simple action based on these.

Testing conditions is divided into two parts:

- **Header** – contains a quick and simple comparison test to distinguish the incoming event. It is composed of an *(Object,Event name)* pair, e.g. *(Thermometer1, Input_update)->*. The test object can be omitted using an asterisk '*' character. All other test types, such as arithmetic operations using the conditions and tests using arithmetic ordering are considered more complex and are dealt with in later steps. The header should contain only items, which are critical to the entire system and which split the rules down into smaller, hopefully, independent sets. This splitting should make practical sense (so a rule, which applies only to one case in a thousand and with the header *(*, Event)* should be avoided).
- **Initializer** – a code that is applied only once, after adding a rule. It usually consists of initial settings of variables (different to a default).
- **Body** – provides further processing of the incoming event, and is only applied if the conditions in the header are true. It contains all the more complex tests and actions.

General notation for a rule:
(Header) ->
[Initializer]
Body

A complete rule might look like this:

(Thermometer1, Input_update) -> gt(Thermometer1.sensor_1, 300),
action(Heating, Heating.SetOut, 0), set(system.heat, 0)
Or with the initializer:
(Teplomer1, Input_update) ->

```
[
    set(freez_thres,0), // freezing
    set(cold_thres,10), // cold
    set(warm_thres,20), // warm
    set(hot_thres, 40), // hot
    set( status, 0 )
]
{
```

lt(G.message,P.freez_thres),set(P.status,0); // current temperature lies in the interval [-inf,freezing)
gt(G.message,P.freez_thres),set(P.status,1); // (freezing, +inf)
gt(G.message,P.cold_thres),set(P.status,2); // (cold, +inf)
gt(G.message,P.warm_thres),set(P.status,3); // (warm, +inf)
gt(G.message,P.hot_thres),set(P.status,4); // (hot, +inf)
}

So the values freez_thres, cold_thres etc. are defined by initializer. Then the system will try to execute commands in parentheses: if the value from G.message (global variable that contains actual parameter of object) is less then (lt – less then, gt – greater then) freezing temperature, a status will be set to 0 and then the result of the row won't affect next rows, as the row is ended by semicolon (as will be told in Syntax, semicolon). If the temperature is not under freezing point, next commands until semicolon will be skipped, as there is no need to evaluate it (as will be told in Syntax, comma). Next rows will be computed in similar way.

5.1.1 Syntax and semantics

All commands, for variables or constants, are case-sensitive (lower and upper cases are significant).

Commands, Functions – Equivalent terms

Syntax: *name(parameter1, parameter2, ...)*

Explanation: Parameters are either variables or constants (see further). They are handled using pointers, so a variable's value can be changed by a command.

The returned value is either *TRUE* or *FALSE*.

Everything is accomplished using commands: testing, calculations, notifications, ..., it is a fundamental instruction type.

Commands have the usual recursive definition, thus *(command operator command)* yields a command.

Variables, Constants

Syntax: *name*, *object.name* or *number*

Explanation: ***A variable*** called *name* belonging to the *object* object. If the object is not specified the variable is associated with the object in the header, or with the object on which the rule is applied (in the case *). Variables are created on the first use, and initialized to 0. Their value is preserved between rules.

Constants are unnamed variables with then initialized value.

For event processing, the global variable*G.message*is available, which contains its current parameter.

Variables may be *public* or *private*. *Public* variables are displayed in monitors, whereas *private* variables are not. Sensor variables are implicitly *public*. User-defined variables (in a rule) are implicitly *private*.

operator , (comma)

Syntax: *command1, command2*

Explanation: If *command1* is successful, then *command2* is executed, and the return value is that of *command2*, otherwise the return value is *FALSE*.

Notes: Like a logical conjunction, the return value is *TRUE* when the entire sequence of commands is successful. Command execution ends on the first unsuccessful command.

operator ; (semicolon)

Syntax: *command1; command2; . . . ; commandN*

Explanation: commands *command1* to *commandN* are executed in sequence with no regard for the return values. The return value is not relevant (but is equal to the return value of *commandN*).

Note: Logical disjunction; The return value is the return value of *commandN*.
A comma (,) has precedence over a semicolon (;).

compound command *{ ... }*

Syntax: *{ command1; command2; . . . ; commandN }*

Explanation: Execution of commands 1 to N. The return value is the return value of *commandN*.

Note: Separating command processing this way only makes sense with complex commands where the internal commands are separated by a semicolon. Braces function as parentheses, i.e., they group commands into a compound, which may be used as a single command.

Whitespace (space, linefeed, tab)
Any whitespace in any amount and in any position does not affect execution. Only the identifiers must be whole.

5.1.2 Data types

- **Number** – basic data type
- **Constant string**

5.1.3 Basic commands

set(x, y) assignment command

effect: x is assigned value y;

return: *TRUE*

diff(x, y, z) calculates the difference

effect: x is assigned the value y - z;

return: *TRUE*

add(x, y) adds a value

effect: x is assigned the value $x + y$;

return: *TRUE*

inc(x) increment the value by 1

effect: *x* is assigned the value *x + 1*;

return: *TRUE*

sub(x) decreases the value by 1

effect: *x* is assigned the value *x - 1*;

return: *TRUE*

bitand(x, y) bit AND operation

effect: *x* is assigned the value *x & y*;

return: *TRUE*

bitor(x, y) bit OR operation

effect: *x* is assigned the value *x | y*;

return: *TRUE*

bitxor(x, y) bit XOR operation

effect: *x* is assigned the value *x Ě, y*;

return: *TRUE*

eq(x,y) equality test

effect: none

return: *TRUE*, if *x* is equal to *y*, *FALSE* otherwise

neq(x,y) inequality test

effect: none

return: *TRUE*, if *x* is not equal to *y*, *FALSE* otherwise

gt(x,y) greater than test

effect: none

return: *TRUE*, if *x* is greater than *y*, *FALSE* otherwise

lt(x,y) 'less than' test

effect: none

return: *TRUE*, if *x* is less than *y*, *FALSE* otherwise

action(device_name, action_name, parameter)

effect: executes the specified action using the specified numeric parameter on the specified device

return: *TRUE*

example: *action(Motor1, Motor1.Set_rotation, 12)*

straction(device_name, action_name, parameter)

effect: executes the specified action using the specified text parameter on the specified device

return: *TRUE*

example: *straction(vivotek_tc5633, vivotek_tc5633.Recall, "window")*

sendMail(subject, address, text) sends an email to *address* with *subject* as the subject line and *text* as its content

effect: none

return: *TRUE*

example: *sendMail("lack of coal", "boilerroom@hotel.cz", "The temperature in the hotel fell below 20 degrees, a top-up is needed.")*

event(device_name, event_number, parameter)

effect: loops the event back to the front of the queue

return: *TRUE*

example: *event(Thermometer1, Input_update, 300)*, where the 300 may be accessed as *G.message*

delay(" ... code ... ", time)

effect: schedule *code* for execution after *time* seconds

return: *TRUE*

schedule(" ... code ... ", time)

effect: schedules *code* to be executed at *time*, given in seconds from the start of the system's time (so-called Unix time)

return: *TRUE*

now(t)

effect: variable t is assigned the current time in seconds based on the system's time (so-called Unix time)

return: *TRUE*

setPublic(x, [0|1]) sets the variable as public or private

effect: if the second argument is *0*, the variable is set to *private*, if it is *1*, the variable is set to *public*

return: *TRUE*

5.1.4 Simple practical examples

Switching a power supply on or off *(system, UserEvent6) ->*
eq(power, 0),set(powernew, 1), action(netio, netio.SetVector, 1);
gt(power, 0),set(powernew, 0), action(netio, netio.SetVector, 0);
set(power, powernew)

Swivel the camera to a pre-defined position *(system, UserEvent3)->*
straction(camera1, camera1.Recall, "chair")

Button control for lights *(system, UserEvent1) ->*
eq(light, 0),set(lightnew, 1), action(camera1, camera1.SetOut, 3);
gt(light, 0),set(lightnew, 0), action(camera1, camera1.SetOut, 2);
set(light, lightnew)

Switch lights off on temperature increase *(Thermometer1, Input_update) ->*
gt(sensor_temperature, 300),
action(camera1, camera1.SetOut, 2),set(system.light, 0)

5.1.5 Basic programming methods and language constructions

Functions Functions and their calling (user defined) is not implemented explicitly. However it is possible to use the **event** and its loopback back to the queue for this purpose. Every set of rules dispose of one virtual object and together with it have 4 billion unnamed events (possible numbers using integer data type), which are unused (they can not arise from the outer cause), and which can be connected with any rule. This rule can be then called using **event** method with proper parameters. Unlike a classical concept of functions, our functions are added to the end of the queue of events asynchronously, so it is possible that other events occur in the meantime. It should be taken into account.

Cycles With the help of the above described "functions" a function calling itself can be constructed. In spite of that it is not a recursion, because the function never returns from its "calling", it can be used for constructing of all kinds of cycles after all.

Conditions

- Conditions *C1, C2, ... CN* in the conjunctive form can be written trivially using the operator , (comma):

C1, C2, ... CN;

- Sets of conditions which are not disjoint in the form *if (conj1) then (command1); if (conj2) then (command2)...*, where *conj1, conj2, ... conjN* is a set of conditions in conjunctive form can be implemented this way:

conj1, command1;
conj2, command2;
...

- Mutually disjoint branches – thus all predicational formulas in CNF with the correct lazy scoring logic of a form *if (conj1) then (command1) elif (conj2) then (command2) ... else (commandN)* can be written using command variable 'c':

conj1,set(c,1),command1;
eq(c,0),conj1,set(c,1),command2;
...
eq(c,0),commandN;
set(c,0)

Note: In the case that conditions are naturally disjoint, this case can be reduced to the previous one (e.g case branching on mutually disjoint branches).

5.1.6 Actions

Actions are commands that can be used inside rules. Support of these commands is device dependent (see Table 5.1 and Table 5.2 on the following page) .

- SetLED – Controls status LED diode of the camera, uses numeric parameter (1 = LED on, 0 = LED off).
- SetOut – Sets digital output arg/2 of the camera to value arg%2, where arg is the only numerical argument.
- SetVector – Sets outputs according to bits of the numeric argument, this command is used for IP Power devices.
- AdminCGI, UserCGI – Sends CGI command to the camera, this commands allow to perform various actions that are not directly supported by IPCorder. For more information see manual for your device.
- Recall – Move camera towards the stored position given in the text argument. This position has to be set up in the web interface of the device.
- Move, Zoom, Iris, Focus – controls position, zoom, iris and focus of the camera. For the correct parameter values please consult manual of your device.

5.1.7 Events

Events represent changes in the state of devices. Each header in conditions contains a name of device and name of its event to determinate when the condition should be active. Different devices sends different events (see Table 5.3 on page 45).

5.2 Terminology

- ***Administrator*** – a user with privileges for changing system settings.
- ***User*** – this term describes an account with no privileges for changing system settings.
- ***View*** – a collection of settings, which determine how the outputs from individual devices are displayed and the layout settings for these on screen.
- ***Monitor*** – a cell, which may be used to build a ***view*** layout, and which contains values from pre-defined sensors.

Table 5.1: Supported actions of Vivotek cameras

	Vivotek PZ6122, PZ6124, PZ7151, PZ7152, SD6122, SD7151, TC5633, VS7100	Vivotek PT7135, PT7137	Vivotek IP7135, IP7137	Vivotek IP31x1, IP7142	Vivotek FD61x1, FD61x2, FD7131, IP3133W, IP31x2, IP61x2, IP61x4, IP61x7, IP7131, IP7132, IP7138, IP7139, IP7151, IP7152, TC5333	Vivotek PT31x2, PT31x3, PT31x4	Vivotek IZ7151
SetLED	x	x	x	-	x	x	x
SetOut	x	-	-	x	x	x	x
SetVector	-	-	-	-	-	-	-
AdminCGI, UserCGI	x	x	x	x	x	x	x
Recall	x	x	-	-	-	x	-
Move, Zoom, Iric, Focus	x	x	-	-	-	-	x

Table 5.2: Supported actions of other devices

	IQeye 301, 302, 303, 510, 603, 701, 702, 703, 705, 711, 751, 752, 753, 755, 802, 803, 805, 811, 852, 853, 855	cameras ACTi	Aviosys IP Power
SetLED	-	-	-
SetOut	x	-	-
SetVector	-	-	x
AdminCGI, UserCGI	-	-	-
Recall	-	-	-
Move, Zoom, Iric, Focus	-	-	-

Table 5.3: List of events

Event	Devices	Purpose	Additional variables
Input_update	Poseidon	Change of value	*sensor_<sensor-name>* or *sid_<sensor-id>* – value of the sensor
Input_update	Papouch	Change of value	*tempvalue* – temperature
CamVideo	all ACTi, IQeye, Vivotek cameras	Recorded video	
FPS_update	all ACTi, IQeye, Vivotek cameras	Updated frame rate	
CamMotionDetect	all ACTi, IQeye, Vivotek except line 3xxx	Detected motion	
DeviceDisconnect	Poseidon, Papouch, ACTi, IQeye, Vivotek	Device disconnected	
DeviceReconnect	Poseidon, Papouch, ACTi, IQeye, Vivotek	Device Reconnected	
DI_trigger	Vivotek FD61x1, FD61x2, FD7131, IP61x2, IP61x4, IP61x7, IP7131, IP7132, IP7138, IP7139, IP7142, IP7151, IP7152, IZ7151, PZ6122, PZ6124, PZ7151, PZ7152, SD6122, SD7151, TC5333, TC5633, VS7100	Updated digital input	*input1 ... input8* (according to the number of inputs) – trigger value
DI_trigger	all IQeye cameras except 501 and 511	Updated digital input	
UserEvent1 ... UserEvent10	system	Free system events that can be assigned for example to buttons	

- ***Rule*** – A series of system settings, which, using a special language, define the reaction to a specific event in the system
- ***Device*** – A device controlled by the system, such as a camera or sensor.
- ***Decimal separator format*** – ***User setting*** defining which character is to be used to separate whole numbers from decimals.
- ***UPnP*** – Universal plug and play. A protocol, which allows devices to provide information about themselves and communicate with each other. It can be used, for example, for dynamically creating tunnels through firewalls, or for multimedia devices.
- ***Schedule*** – A set of time intervals, defining when the ***rules*** it lists are to be applied.
- ***Identification*** – is a short alphanumeric string, which identifies a device controlled by the system (e.g. a camera). The string is used in rules and other similar situations
- ***Device name*** – A name, which the system uses to identify a device (e.g. a camera) to the user.
- ***Variable monitor*** – the cell of a ***view***, which displays ***sensor*** values and ***system variables***
- ***Live Stream Monitor*** – the cell of a ***view***, which outputs live camera footage.
- ***View cell*** – a cell containing a ***monitor*** (camera output), the two are basically synonymous.
- ***DI*** (digital input) – Interface, which allows various sensors to be connected to the cameras.
- ***DO*** (digital output) – Interface, which allows the camera to switch various relays.

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